This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

SB
354
C5

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

COLLEGE OF AGRICULTURE LIBRARY Berkeley, Cal.

UNIV. OF CALIFORNIA

DEPARTMENT OF AGRICULTURE, NEW SOUTH WALES.

Bulletin No. 1.

REPORT OF THE CONFERENCE

OF

FRUIT-GROWERS AND VINE-GROWERS,

TOGETHER WITH APPENDICES.

ISSUED BY DIRECTION OF

THE HON. SYDNEY SMITH, M.P.,
MINISTER FOR MINES AND AGRICULTURE.

H. C. L. ANDERSON, DIRECTOR.

OCTOBER, 1890.

T. Seabrook ...
... ... 37
Whitaker 48
ines. Dr. Fiasch 52

By Authority:
SYDNEY: CHARLES POTTER, GOVERNMENT PRINTER.
1890.
[Price

Digitized by Google

495034

UNIV. OF
CALIFORNIA

SF354
C5

Digitized by Google

M. N. W.

PAPERS.

PAGE

Opening Address by the President 3

Present state of Fruit Cultivation, and the best means of improving it—

Fruit Cultivation in New South Wales: its present state, and future prospects. F. H. G. Rogers 7

The present state of Fruit Cultivation, and the best means of improving it. J. Gelding 13

Fruit Cultivation. Jas. Purser 16

History and Culture of the Orange. Thomas Pye 18

Fruit Cultivation in New South Wales. W. Stieme 22

The suitability of the Gosford District for Fruit Cultivation. A. Hunter 25

Present state of Fruit Cultivation in the County of Cumberland. W. B. Campbell 26

Introductory Notes on Vine Culture in New South Wales. T. K. Stiefvatersen 27

The present state of Fruit Cultivation. W. Bridle 29

Fruit Cultivation and the best means of improving it. Geo. W. Willis 30

The effect of Railway Charges on the Fruit Industry. T. A. Johnstone 32

Orchard Cultivation in England and France. John Plummer 33

Bees as Fertilisers and Fruit Producers. W. T. Seabrook ... 35

Discussion on Previous Papers 37

Planting New Orchards and Vineyards—

Cultivation of the Grape Vine. E. Whitaker 48

The best distance for Planting Vines. Dr. Fiasch 52

Digitized by Google

495034

PAGE

Planting Vineyards. Samuel McWilliam 55

Some Practical Hints on Viticulture. James Beattie... ... 56

The Planting of New Orchards and Vineyards. W. Stimson.. 61

Laying out New Orchards and Vineyards. James Wright ... 64

Discussion on Previous Papers 66

Wine-making: Its prospects, and the best means of advancing the industry—

Directions for Fining Wine. P. F. Adams 76

How to make Agricultural Shows one of the best means of improving Wine-making. Dr. Fiaschi 82

On Wine-making. H. E. Bonnard 84

Wine-making: its Prospects. J. D. Lankester 87

Wine-making for Exportation. L. Frere 90

Alcoholic Strength of Australian Wines. P. E. Fallon ... 93

The best means of Improving and Advancing the Wine Industry. W. B. Campbell 94

Discussion on the Previous Papers 96

Pests—Animal, Insect, Fungoid, and Weeds—

Insect Pests and Australian Agriculture. A. Sidney Olliff ... 102

The Phylloxera Vastatrix. Honorable P. G. King, M.L.C. ... 107

How to exterminate Phylloxera without uprooting and destroying the Vines 109

Insect, Fungoid, and other Pests which attack Vineyards. James Beattie 112

Pests and their Cure. G. H. Willis 113

Orchard Pests—Animal, Insect, and Fungoid—and Weeds. R. Scobie, M.L.A. 116

Flying Foxes and Sparrows. W. H. M'Keown 120

The Codlin Moth and its habits. T. Grunsell 121

Best Treatment for Destroying Codlin Moths. J. H. Dickenson 123

Insect and Fungoid Pests and Weeds. E. H. Acres... ... 124

Red Scale on the Citrus Tribe. J. Patterson 126

Pests. C. Bradbury 126

Digitized by Google

PAGE

Discussion on the Previous Papers 128

Notes on Pests of Peach-trees. A. G. Hamilton 149

Birds which are Enemies or Friends of Fruit-growers. A. G. Hamilton 151

The Selection of Varieties of Fruit most suited to the respective Districts for Cultivation for Commercial Purposes—

Fruits adapted for our most Tropical Districts. W. S. Campbell 155

The Varieties of Fruit most suitable for growing in the Fairfield District. W. Stimson... 159

Improved Methods of Packing and Transport, and Market Accommodation for Fruit—

Export of Oranges and Experience thereon. C. B. Cairnes 161

European Markets for Australian Wines, and Packing Oranges and Grapes for Export. J. Plummer 164

Improved Methods of Transport for Fruit. W. Cleghorn ... 167

Transport of Fruit. J. Beattie 169

Experience in Export of Oranges to London. E. H. Acres... 170

The Gathering and Packing of Fruit. T. Lawless 172

The best way to Pack, Transport, and make suitable Market Accommodation for Fruit. W. Stimson 174

Present Unsatisfactory System of Marketing Fruit in Gin-cases. J. Roughley... 178

Market Accommodation. T. Jessep 181

Discussion on Previous Papers 187

Miscellaneous Subjects—

Fruit Candying Industry at Leghorn (Italy). A. P. Reynolds 193

Fruit Preserving. C. W. Hill 195

Do G. V. Rahn 197

Correct Nomenclature of Fruit Trees. C. Gambling... ... 201

Inspection of Affected Fruit coming into the Colony. C. A. Jackes 202

Discussion on Previous Papers 202

Digitized by Google

APPENDICES.

PAGE

The Capabilities of certain Districts of the Colony for Fruit and Vine Cultivation; being Collated Information from that furnished by Orchardists and Vignerons—

Appendix A—Northern Coast District 207

Appendix B—Northern Tablelands 211

Appendix C—South Coast District 214

Appendix D—Southern Tableland 225

Appendix E—Western District 234

Appendix F—Birds Useful to Agriculturists, Fruitgrowers, and Farmers. Dr. E. P. Ramsay, F.L.S., &c. 240

Appendix G—Australian Birds, Useful and Noxious. Hon. James Norton, M.L.C. 245

Appendix H—Insecticides. Dr. J. C. Neal... 256

Digitized by Google

UNIV. OF CALIFORNIA

Report of Conference of Fruit-Growers and Vine-Growers.

JUNE, 1890.

On the 16th May, 1890, the following circular was, by direction of the Secretary for Mines and Agriculture (the Hon. Sydney Smith), issued to Agricultural Societies in fruit-growing districts:—

Department of Agriculture, Sydney, 16 May, 1890.

Circular to Agricultural Societies in Fruit-growing Districts.

In view of the growing importance of the fruit and wine industry of New South Wales, the Minister for Mines and Agriculture has decided to ask delegates from the chief fruit-growing centres of the Colony to meet in conference. He has taken this step in order that an important section of the agricultural community may be brought into touch with the Department of Agriculture, and their needs and wishes noted, and, if practicable, met.

The Conference will take place on Monday, 16th June, at 10 a.m. One delegate will be invited from each centre, and a free pass over the railways will be issued to facilitate attendance in Sydney. The Minister will preside. Among the subjects for papers and subsequent discussion the following may be mentioned as being the most important:—

1. The present state of fruit cultivation, and the best means of improving it.
2. Planting of new orchards and vineyards.
3. Wine-making: Its prospects, and the best means of advancing the industry.
4. Pests—animal, insect, and fungoid—and weeds: The best means, legislative or otherwise, of keeping them in subjection.
5. Friendly insects: Best means of recognising and encouraging them.
6. The selection of varieties of fruits most suited to the respective districts for cultivation for commercial purposes.
7. Improved methods of packing, transport, and market accommodation for fruit.
8. Greater facilities for obtaining knowledge of the markets of the world.
9. Any matter of interest previously notified in writing to the Minister, and approved by him.

Your Society is therefore invited to nominate, as early as possible, a delegate to this Conference, giving name and address, and intimating whether he wishes to furnish a paper on any of the above subjects. Immediately on receiving your nomination I shall communicate further details to him direct.

H. C. L. Anderson,
Director of Agriculture.

The Conference met on Monday, 16th June, at 11 o'clock, in the Board Room, Colonial Secretary's Office, and continued its sittings until the evening of the 19th instant.

The Secretary for Mines and Agriculture presided.

The following are the names of the Delegates who attended the Conference:—

Adams, P. F., Liverpool.
Abell, E., senr., Wallsend.
Bennett, S. J., Hawkesbury.
Beattie, James, Wagga.
Black, F., Glen Innes.
Brown, W., Rooty Hill.
Bridle, W. H., Tumut.
Barrett, W., Burrawang.
Bucholtz, F. A., Mudgee.
Barnes, E. P., J.P., Cootamundra.
Campbell, W. S., Lismore.
Cato, H. C., Sydney.
Chapple, J. D., Gunning.
Chisholm, J. K., Narellan.

Digitized by Google

Cleghorn, Wm., Uralla.
Culley, B., Urana.
Creswick, W., Rooty Hill.
Cairns, C. B., Parramatta.
Campbell, W. B., Blacktown.
Dangar, O. O., M.P.
Davis, A. E., Allandale, Hunter River.
Evans, —, Dapto.
Fiaschi, Dr., Richmond.
Frauenfelder, J., Albury.
Frere, L., Thurgoona.
Grunsell, T., Goulburn.
Grabham, C., Tamworth.
Gown, F., Murrumburrah.
Gambling, C., Thornleigh.
Gelding, J., Sydney.
Hopkins, J., Sydney.
Harwood, H. S., Parkes.
Harris, E., Carlingford.
Harris, W., Hornsby.
Holmes, S. H., Allandale, Hunter River.
Hunter, A., Gosford.
Hayes, J., Singleton.
Hall, C. W., Sydney.
Johnston, Thos. A., Singleton.
Jackes, C. A., Armidale.
Jessep, Thos., J.P., Sydney.
Kelman, James, Branxton.
King, Hon. P. G., Sydney.
Lamrock, W., J.P., Richmond.
Lee, C. A., M.P., Tenterfield.
Lankester, J. D., Albury.
Lansdowne, A., Goulburn.
M'William, S., Corowa.
M'Keown, W. H., Gordon.
Miller, Thos., Tenterfield.
M'Kay, Dr., Rooty Hill.
Oram, W. H., Crookwell.
Pearce, E. H., Seven Hills.
Pembroke, W. W., Young.
Pulver, R., Wagga.
Payne, C. B., J.P., Braidwood.
Perry, J., M.P., Alstonville.
Pye, Thos., Seven Hills.
Purser, J., Castle Hill.
Rahn, G. V., Germanton.
Relton, W., Armidale.
Roughley, J., Dural.
Rheinberger, P. J., Mudgee.
Reedy, T., Menangle.
Rogers, F. H. G., Castle Hill.
Scobie, R., M.P., West Maitland.
Spurway, W., Ryde.
Smith, Mat., Seven Hills.
Suttor, Hon. W. H., M.L.C., Bathurst
Suttor, G. F., Baulkham Hills.
Stimson, W., Fairfield.
Stieme, W., Fairfield.
Tamsett, Jas., Parramatta.
Thompson, J. A. Onslow, Menangle.
Vivian, W. H., M.P., Port Macquarie.
Whitaker, E., Parramatta.
Wilkinson, J. A., Sydney.
Witts, Broome L., Gosford.
Wright, Jas., Rooty Hill.
Willis, G., Corowa.

The following specimens of fruit were exhibited:—

By Mr. F. Gown, Murrumburrah—
Apples—several varieties.
Oranges and lemons.

„ Mr. W. Stieme, Fairfield—Oranges (several varieties) and some new seedlings.

„ Mr. Hayes, Singleton—Oranges and mandarins.

„ Mr. E. H. Holmes, Hunter River—Olives.

„ Mr. T. Knight, Dural—Oranges.

„ Mr. Jacobs, Allandale—Affected peach-tree.

„ Mr. Willis, Corowa—Currants.

„ Mr. J. Patterson, Tamworth—
A collection of apples.
Late grapes.

Digitized by Google

The PRESIDENT, in opening the proceedings, delivered the following address:—Allow me first to express the great pleasure I feel in presiding over such a representative gathering of the fruit-growers and vignerons of the whole Colony. I see before me delegates from every fruit-growing district in New South Wales—from Tenterfield and Armidale in the north, to Albury and Corowa in the south. This excellent response to my invitation, your presence here, doubtless at considerable personal inconvenience to yourselves, is a gratifying proof of the necessity of the step I have taken in inviting you to meet myself and the officers of this young department in conference. It cannot be doubted that meetings of this sort, where all are actuated with the desire of advancing their common interests and working together for the common good, must be productive of much benefit. They bring the department into touch and sympathy with the class whose interests it has been created to serve, and give those deeply interested an opportunity of bringing their opinions, their needs, and their difficulties before the Government of the day. I am anxious to galvanise into constant activity the Agricultural Societies and Fruit-growers' Unions throughout the Colony, so that there may be living agencies through which the department can carry on its beneficial operations, and that there may be, as it were, one large organization throughout the Colony for mutual improvement and protection. I need not descant upon the importance of the fruit trade to this Colony. When we reflect that Great Britain last year imported fruit, dried and green, to the value of £6,000,000, it is evident that there is a very big market for export to our own kinsfolk alone; but on observing that we ourselves had to import from America, England, and our neighbouring colonies fruits, jams, &c., to the value of £386,247, as against exports to the extent of £250,469, it is at once evident that we have not yet reached the stage when we need fear over-production. We are peculiarly well situated in regard to climate and soils for fruit, for I think I am right in saying that between the Richmond River and the Monaro Plains we can grow almost every fruit that we can desire—from the tropical pineapple and mango to the hardy gooseberry. The area of our orchards and orangeries increased last year from 27,162 acres to 28,671 acres; of vineyards, from 7,072 acres to 7,867 acres, producing 192,827 gallons of wine and 2,951 tons of grapes. We imported wine to the value of £116,666, and exported to the extent of £37,222. And yet it is an undeniable fact that there are places in New South Wales where it does not pay to grow fruit—where they are a drug on the market. Distance from a good market and high rates make it practically useless as a crop. Is it not possible that the wider extension of the enterprise shown by Mr. W. Lamb at his canning factory at Rooty Hill might enable us to utilise more of this surplus fruit, and diminish our bill to San Francisco for canned peaches and apricots? You will notice that there are a great many subjects suggested for your deliberations, but not one of these can be called unimportant. I shall first ask for some short papers on the present state of fruit cultivation, and the best means to be used to improve it. There are many very successful fruit-growers in this Colony, and there are likewise many who, through want of a little knowledge at the critical period, wasted time, money, and energy in this branch of industry. I have seen men planting the wrong sorts of fruit for their district, the wrong sorts of grape for their purpose, choosing unsuitable sites for their orchards, using bad methods of cultivation, treating the soil wrongly, and in other ways misapplying their energy, to their own great loss and discouragement. The department will collate the experience of our most intelligent and most successful fruit-growers for the benefit of

Digitized by Google

others less highly favoured. In our proposed college and experimental farms we intend to plant a few acres of fruit and vines, where our sons can learn the correct methods and newest ideas. This important branch of industry should receive at least as much attention as is given to other trades and callings. We intend to get together a collection of models of correctly-named varieties of fruit, to be exhibited at country shows as much as possible, with instructions as to the sorts most suitable, commercially, for the respective districts. With regard to the planting of new orchards and vineyards, I believe every man of experience will admit that, had he to do the work over again, he could do it much better and much cheaper. Should we not unselfishly impart our riper experience to those needing it, as to the selection of appropriate soil, site, aspect, cultivation, drainage, varieties most suitable, and many other little points of such vital importance? The third subject, "Wine-making, its prospects, and the best means of advancing it," is most important. There seems every indication that wine-making will ere long be second in importance only to wool-growing. Our wines are gradually attaining their proper place in the markets of the world. While others are recognizing their excellence, we are perceiving their defects, and using science and skill to remedy them. In furtherance of this end, can we do better than utilise, as far as possible, the experience of older countries adapted to our own circumstances, and give the subject the prominence in our system of agricultural education that its importance demands? It may well be asked, has the time arrived when our sons need a viticultural college and fruit station combined, where experts can impart special education in these subjects? I purposely combine wine and fruit, believing, as I do, the policy of relying solely on one crop is not a wise one, whether as to fruit or any other branch of agricultural industry. The warning of the devastation caused in other countries through a single pest should make us pause and reflect well on the advantages of mixed farming—not having all one's eggs in one basket. And the word pest brings to mind the many troubles to which fruit-growers seem peculiarly liable. We have to inquire as to pests and weeds—the best means of overcoming them. It may safely be argued that pests, like other difficulties, are only sent to stimulate us to increased diligence and care. The experience of past years with potato blight (Peronospora infestans) in 1847–48, the grape mildew (Oïdium) of Madeira in 1851–52, the rice blight (Erysiphe) of India in 1883–84, Colorado beetle amongst potatoes in 1877–78, Hessian fly in wheat, and last, and worst, phylloxera on the vine of the past twenty years, all goes to show that energy and skill directed by scientific truth can subdue these as all other difficulties. We have troubles enough and to spare, but we have neighbours worse off than ourselves. Our peach aphis, apple blight, orange scale, mealy bug, codlin moth, mussel scale, root-galls, and other pests, combine to show us the need of united action—broad national action—to keep them in subjection. I have not been unmindful of the urgent need of help in these matters, and have been fortunate enough to secure the services of Dr. Cobb as Pathologist, and Mr. Olliff as Entomologist, to instruct the fruit-growers as to the various noxious fungi and insects. In the first number of the *Gazette*, which I trust will be welcomed as a valuable educational agency, will be found a complete paper with illustrations of the codlin moth, notes as to other insects and fungi, and details as to a new trouble that is attacking our root crops and peach-trees. You will see the need of trained scientific men to definitely recognise these things, and direct our energies in seeking effective remedies. It is very interesting to notice that close alongside the poison is often found the antidote. America,

Digitized by Google

which gave us the apple blight and phylloxera, has also given us blight-proof stocks for the apples and phylloxera-resisting stocks for our vines. It gave us the codlin moth, and is now supplying New Zealand, it is said, with a beetle to destroy it. In return, we have given that country our ladybird to devour their orange scale; and I was much interested to see the other day some vine roots infected with colonies of phylloxera, and close alongside a little mite making a hearty meal of them. All insects, then, are not bad; so it will be one of our most important duties to teach in every way possible the best means of identifying our friends in the insect world, and to that end I hope to see many plates in our *Gazette*, afterwards to be utilised in our school-books for the rising generation. It is a purely technical matter to identify these predaceous insects, and they must be utilised when found as much as possible. As insects—friends and foes—are got together, they will form a valuable museum of reference for all concerned, from which to identify for themselves the different sorts. Then, again, some birds are well known to be insectivorous. It will be a matter worth inquiring which of them are worth preserving for their kindly aid. One of the most difficult questions for you to discuss is the means to be adopted to keep these pests in check. There must be no hasty legislation in a panic. We must have recourse to the experience of other countries which have legislated in this matter, and must each and all be prepared to give and take, to consider the whole matter in a broad national spirit, and to approach the whole subject with but one desire—to do the best possible for the whole community. I am confident that the experience and suggestions of such a practical and representative gathering as this will greatly strengthen the department's hands in dealing with this difficult question. I see that you are also to discuss the selection of varieties of trees and grapes most suited for the respective districts. The Director has sent out a series of questions to 200 of the leading fruit-growers of the Colony, and the experience of these, when collated and published with the proceedings of this Conference, ought to be of much service. When districts are classified according to their average temperature, soils, rainfall, &c., it will be a more easy task to give definite advice as to the sorts most suitable. The subjects of improved methods of picking, packing, transport, market accommodation, new markets in the world, are very important. We have the good luck to be at the antipodes of our greatest customer—England—and ought therefore, under improved conditions, to be able to supply her when her market is barest. All these matters vitally concern the commercial success of fruit-growing; and if your combined experience points to any improvements that can be effected by our agency, I can promise that this department will use its influence with the Railway Commissioners and other authorities towards that end. When we consider the £20,787 spent on American canned fruit, we can recognise the importance of adopting means of utilising surplus fruit in a year of glut, or in places so remote from a market as to preclude the possibility of profitably dealing in fresh fruit. Can we not produce in some degree our own raisins, dried figs, dried apples, currants, prunes, and canned peaches? With regard to the nomenclature of fruit, there is admitted to be great confusion. A good collection of models will help to rectify this, a fruit station where trees typical of all varieties true to name will be grown, and the advice of an expert in fruit culture will be available, must tend to diminish this confusion. I hope to see next autumn a fruit conference, to which all the products of our fruit gardens will be brought for classification, comparison, and identification. I might go on to speak of the great possibilities of irrigation for our drier districts, and of judicious water conservation for even our more favoured coast plains. There

Digitized by Google

are many points I might lightly touch on and direct your attention to, but this will suffice to show that I recognise fully the importance of this valuable adjunct to general agriculture. I see in every orchard planted, in every vineyard established, a splendid inheritance for the next generation,—another token of the stability and future prosperity of our country. I will simply express the wish that my best expectations with regard to this Conference will be realised, and that it will be pregnant with good to all personally concerned, and to our great colony in general. (Applause.)

Mr. C. A. Lee, M.P., Tenterfield, before the formal business of the Conference commenced, said he desired to say one or two words with regard to the object of the Conference, and of the department that had been the means of bringing it into existence. In the first place, on behalf of those delegates whose acquaintance he enjoyed, and, perhaps, also for the majority of those present, he desired to congratulate the President on the action he had taken in convening the Conference. The President had taken a step of which neither he nor any thinking man could see the ultimate consequence. To speak of the capability of the country to produce fruit, as the President had done, would be to go backward. That was an approved and accepted fact. We had a knowledge of the capabilities of the country, but we had not the knowledge requisite to turn those capabilities to the best advantage. The vine and fruit growers of New South Wales congratulated the Minister upon having established a Department of Agriculture upon practical lines. During the short time the department had been in existence it had given evidence of an earnest determination to achieve some sound practical results for the country. Personally, he was pleased that the department had taken a practical form, instead of being surrounded by that red-tapeism which would have made it a curse instead of a blessing to the country. The assembly which the Minister had brought together was one of an eminently practical character. He noticed gentlemen present who had been practically engaged in the cultivation of fruit for many years, and who came from all parts of the country. The outcome of bringing these experienced men together to exchange ideas would be to establish closer relations between them and the department, and to cause much valuable information to be obtained and circulated through the country, which otherwise could not have been done. During the debates of the Conference he hoped each delegate would endeavour to reduce his remarks to a practical form, and to avoid speech-making for the sake of speech-making. He again congratulated the Minister upon having initiated the Conference; it was a step in the right direction, and must assuredly in the end benefit the country.

Digitized by Google

Present State of Fruit Cultivation, and the Best Means of Improving it.

Fruit Cultivation in New South Wales: Its Present State and Future Prospects.

F. H. G. ROGERS, Castle Hill.

FRUIT-GROWING, although still in its infancy, yet promises soon to rank among the chief industries of the Colony. A glance at our weekly and at most of our daily papers, apart from those connected with fruit-growing districts, is sufficient to indicate the progress fruit-growing is making as an industry. A few years ago fruit was hardly grown for market, people contenting themselves with selling simply what they could not consume. Now that period is past. Growers have found that a profitable livelihood is to be made out of this pursuit, and the enterprising ones are deliberately laying themselves out for making fruit-growing a success. The present state of fruit cultivation is, generally speaking, in a backward condition, which may be accounted for by the fact that the fruit-grower hitherto has found no difficulty in making a comfortable living without the necessity of expending much labour on the cultivation of his orchard. Until recently the fruit-grower has had the markets pretty much to himself. But the time has now arrived when the fruit-grower is brought face to face with keen competition in the shape of imports from neighbouring colonies and from America, and he will be obliged to consider the cheapest and most profitable way of working his orchard, as well as to adopt the most improved systems, in order that his orchard may be made to produce compensating results. The slow, apathetic way of the average fruit-grower of the Colony will have to give place to these new methods which scientific researches and practical experiments are now teaching us. We find American exports successfully competing with our locally-grown fruit in the Sydney markets. That the American fruit-grower is enabled to do this points to the conclusion that his system of fruit cultivation must be far in advance of ours. If it pays the Americans to transport fruit from San Francisco to Sydney, surely greater profit is to be made by our own local producers. But it is to be feared that the fruit-grower of New South Wales will never leave the old lines until stress of circumstances compels him. As a rule, what their fathers did in years gone by they still religiously carry out, and any new system is viewed by them with misapprehension. In the fruit-growing district of the county of Cumberland, which is admitted to be the greatest fruit-growing centre of the Colony, there are abundant proofs of the unsystematic way in which the cultivation of fruit is carried out. Each farmer has from 5 to 50 acres under fruit. As a rule his trees are obtained from any source, without regard to species or variety. Most frequently he obtains his trees from the man who will supply him the cheapest. It is understood that I am speaking

Digitized by Google

of the fruit-growers as a body, for, of course, there are many exceptions. An orchard is planted, and the owner quietly awaits the results. He gives a certain amount of attention to it, such as keeping it free from weeds, but he makes no provision for irrigation in dry years, or drainage in wet years. He troubles his head very little about opening up a new market, and seems perfectly content if at the end of the year he finds that he is not in debt. This sort of thing may have answered twenty years ago, when, the demand being in excess of the supply, there was therefore no trouble to dispose of fruit at a good price, but competition is now compelling him to awaken to a sense of his condition. For my own part, I heartily wish that there were twice as much fruit grown in New South Wales as at the present time, for then we should have canneries and factories established in our midst, and our industry would be placed on a footing equal to that of the Americans. I take it that it is the object of the Conference to consider and point out to the fruit-growers of the Colony the best means whereby their orchards can be made to produce such results as will not only lead to the full development of fruit-growing as an industry, but also tend to the establishment of the concomitant industries of fruit-preserving, canning, exportation, &c., and thus make fruit-growing become one of our leading sources of national wealth. In this paper I purpose to briefly allude to the following subjects, viz., selection of land, cultivation, species, packing and marketing, and exportation.

Selection of Land.

One is usually guided by what is already grown on similar land. Oranges will grow in a variety of soils, the best being a sandy loam. But before planting an orchard one should be careful to select the best available soil, for, although artificial means will accomplish much, yet the having of a good suitable soil to start with is half the battle. Success also depends on the aspect chosen, as it is important that the land should be sheltered from high winds, and good results would follow planting around the orchard belts of shelter-trees such as the *pinus insignis*. The loss in windfalls to the orange-grower in many instances exceeds 25 per cent.; and the reason why the Dural products remain so much longer on the trees than do oranges grown in other parts of the district is, perhaps, owing to the fact of those orchards being sheltered by the natural bush-trees. The district of Dural is not nearly so much cleared as are other producing districts, such as Castle Hill, Seven Hills, and Pennant Hills. Hence the orange-grower may conclude that his loss in windfalls would in a great measure be obviated if a windbreak existed. Moreover, a row of tall trees around the orchard would serve as a protection against the damaging effects of frosts.

Cultivation.

Good cultivation is the first requirement in fruit-growing, and receives far too little attention. It is a waste of money to plant trees and not to thoroughly cultivate them. Indifferent cultivation is but too likely to bring poor results, or none at all, to the owner. In no case is the old saying truer than in the business of fruit-growing: "What is worth doing at all is worth doing well." Without doubt the prevalence of many diseases which the fruit-grower has to combat is owing to the want of good cultivation. A better means of eradicating these diseases than the best specific is the thorough cultivation of the orchard. New diseases are constantly finding their way into our orchards which formerly were unknown. The reason for this may be found in the constitution of our trees having been weakened,

Digitized by Google

and their being consequently more liable to contract diseases. I purpose dividing the subject of cultivation into different headings, which may be classified as follows :—1. The urgent need of an Agricultural College. 2. Working of land. 3. Drainage. 4. Irrigation. 5. Manures.

Every fruit-grower feels strongly the need of an Agricultural College to collect and diffuse information on all subjects pertaining to fruit culture. The benefit the industry would derive from such an institution cannot be estimated. Our soils could be analysed, and we should then know what particular kind of fruit would suit our farms. We should also learn what properties our soils are deficient in, and how these properties may be replaced. The establishment of experimental gardens in connection with the college would determine the value and suitability of every kind of fruit for cultivation in the different parts of the Colony, without the growers having individually to find this out for themselves. It is important that the orchardist should know what properties are lacking in his soil for the kind of tree already growing. This information is now difficult and costly to obtain. I take it that it would be the duty and aim of the college to analyse the various soils of the fruit-growing districts, so that the farmers of those districts may obtain the desired information at a minimum cost. It should also be the means of affording information on the subjects of drainage, irrigation, and manures, especially the latter, as experiments with the different kinds of manures could easily be made, and by this means the growers would know what manures to use in supplying deficiencies existing in their soils. I will now read an extract from *The Times* on agricultural experiment stations in the United States, which indicates the vast scope of work within the reach of the proposed college:—"Agricultural Experiment Stations in the United States.—In America, as in this country, the agricultural bureau has recently been raised to a department. The new secretary, in his first statement, which is summarised in a report by the British Consul-General in New York, refers to the agricultural experiment stations which are under his control, and which are doing so much for scientific agriculture all over the world. He says it is the duty of his department to indicate lines of inquiry for the stations, to promote the co-ordination of their work, to give them advice and assistance, and to collate and publish the results of their experiments. Its representatives visit stations, agricultural colleges, and kindred institutions. It collects statistics and other information regarding agricultural science; compiles results of inquiry, past and present, in America and in Europe, which are greatly needed by the station workers and others interested in agricultural science; and puts the results of station work in practical form for general distribution in farmers' bulletins. There is a pressing demand for the enlargement of this work. The study of the problems relating to the food and nutrition of domestic animals and of man, and the systematic investigations of soils, should be especially undertaken on a broad and scientific basis. The system of experiment stations in the United States began only fourteen years ago, but it has grown all over the land, enlisted the best colleges and universities and the ablest investigators, and secured both State and national resources for its maintenance. It now employs nearly 400 workers to promote agriculture by scientific investigation and experiment, and to diffuse as well as increase agricultural knowledge. It has the favour of a great army of practical farmers, to whom it has already brought substantial benefits. 'Crudity and mistakes are here and there apparent, but the general effort of the stations toward the greatest usefulness, the wise action of the Association of American agricultural colleges and experiment stations, the cordial support of the people, State Legislatures,

Digitized by Google

and Congress, and the practical results already obtained, imply that the national Government has made no mistake in undertaking this enterprise on a larger scale than has been attempted elsewhere in the world.'"

Working of Land.

This depends in a great measure on the nature of the soil, some soils requiring a great deal more working than others. My opinion is that the oftener the ground is worked the better, as it assists fertilisation by sun and air, and roots live in a great measure on air. I also think that the ground, if possible, should be mulched during the summer months. A good coat of mulching gives a number of advantages. It secures sufficient moisture for the roots, and also protects them from the fierce rays of the sun. It avoids the necessity of working the land for the time being, and also adds fertility to the soil. A good mulching of bush leaves is equal to, if it does not surpass, a coating of artificial manure. The use of labour-saving appliances is a subject that I hope will be specially dealt with.

Drainage.

I now come to the most important feature connected with the cultivation of fruit. It is a well-known fact that nothing is more injurious to the orange-tree than a wet subsoil. When excessive moisture is permitted to remain around the roots, the trees either die or become stunted or diseased, and consequently unproductive. By draining off the surplus water from the soil the air is allowed to circulate through the soil, thus decomposing many of the compounds in the soil, and assisting the moisture to dissolve the elements of fertility. It is also known that drained land is less injuriously affected by a drought in summer than undrained land, because drainage increases the power of the soil to absorb and retain moisture, so that it benefits the soil by assisting to prevent injury resulting from too much or too little moisture. From this it is evident that drainage is as necessary to conserve moisture in dry seasons as to carry off surplus water in wet years. A complete system of drainage can only be obtained by means of underground drains. The distance apart of these drains depends on the nature of the subsoil, a clayey subsoil requiring considerably more draining than a sandy one. The depth of these drains should never be less than 2 ft. 6 in., and in stiff soils should be 3 ft. 6 in. Deep drains are the most effective, as these may be placed at a greater distance from each other, and ultimately entail less expense than shallow ones. The land so drained is not only more thoroughly done, but the water from drains over 2 feet deep is clear, while that from shallow drains is muddy, thus showing that the latter system carries off valuable constituents from the soil. I have had an opportunity of observing the good effects of a system of drainage on my orchard at Castle Hill, where the subsoil is a friable clay. Of the many methods used for underground drains, perhaps the drain tiles are the best, on account of being cheap, durable, and effective. My drains are 36 feet apart, and from 2 ft. 6 in. to 3 feet deep. This season has been an exceptionally wet one, and hundreds of trees of the Citrus family, especially lemons, are dying in Central Cumberland, owing to the excessive moisture in the soil. Were drainage to be adopted, probably there would be no reason to complain of the loss of trees from this source, and to drain is certainly cheaper than to replace trees.

Irrigation.

Irrigation, which is one of the characteristics of successful fruit-growing in America, and now in Victoria, is, as yet, almost untried in New South

Digitized by Google

Wales, but we hope we are on the eve of something in this respect being done. As the foregoing outline of drainage indicates how the evil of excessive moisture may be dealt with, so must irrigation also be attempted to meet the necessities of dry seasons. In the hilly district of Central Cumberland it is almost impossible to look for irrigation works being carried out, but as the average rainfall is about 50 inches per annum, perhaps extensive works are hardly necessary. Still, it should be the first duty of every orchardist to have stored an ample supply of water, which he can convey, either by pumping or gravitation, on to his orchard. The good health of the trees, and the fair crop of fruit that results from such care and forethought, has already been known to justify the expense in the opinion of those who have tried the experiment.

Manures.

The foregoing branches of cultivation, viz., working of land, drainage, and irrigation, however skilfully performed, will not prevent the soil exhausting its fertility—they will rather hasten it. As the chief aim and object of cultivation is to obtain good crops of fruit, it follows that the more successfully this is achieved the more quickly will the soil be deprived of its good qualities. Unless these qualities are replaced, their loss soon becomes apparent. As the fruit-tree draws nearly the whole of its substance from the surface perhaps the most efficient way is to cart new soil into the orchard. But this is slow and expensive, and in many cases cannot be carried out. The farmer must, therefore, ascertain what organic constituents of soil his trees require, and so replace these by artificial manures. Hence the necessity of his being supplied with accurate information as to the state of his soil and its deficiencies for specified trees.

Species and Varieties.

We have, beyond a doubt, a splendid collection of fruit-trees in the shape of varieties, but these require classifying, and the worthless ones should be discarded. We cultivate too many varieties. A preservation of a smaller number of the best quality and prolific bearers would pay better than cultivating a large number. The nomenclature of fruit being sadly at fault is a serious drawback to fruit-growers, both in competing at shows and in supplying orders for customers in the ordinary course of business. The only method by which this can be rectified is by providing that when an agricultural college is an accomplished fact there shall be, in connection with it, a collection of models for the purpose of identification; then we will have a common name for every variety grown throughout the Colony.

Packing and Marketing.

The packing of fruit is too often indifferently performed, and lack of instruction causes a large annual loss. Little care is taken as to sorting, all qualities and all grades being found in the same box. From the little experience I have had in this matter, I consider the packing of fruit almost an art, and one that requires studying. It is a matter of regret that some means cannot be devised by which the much-talked-of "case question" could be solved. In the first place, the gin-case, which is the one most used by growers at present, should be discarded; and there should be adopted a small neat case, to be sold with the fruit—a case which would contain about a bushel. The pecuniary loss sustained by growers by the loss of empties is heavy, and it is probable that selling the cheap case with the fruit would, in the end, prove to be the most economical. If a smaller-sized case were used, and the case sold with the fruit, we should find that consumers would

Digitized by Google

often buy direct from the producers, and the profits now reaped by middlemen (which is the cream) would then be divided between the producer and the consumer. This system has been adopted by American growers and mainly because the returning to the orchard of the empty cases has been found to be prolific of disease dissemination.

Market Accommodation.

The need of better market accommodation and better facilities of disposing of our fruit is doing a great deal to retard the progress of the industry—in fact, it is the most pressing difficulty that now faces the grower. The whole population of Sydney consumes only a few shillings' worth of fruit per head annually. There is room for vast improvement here. It shows that the retail prices place the fruit beyond the reach of the bulk of the population. That such is the case has been long evident to the fruit-growers. But no steps have been taken to bring about a better condition of things. The system by which the growers dispose of their fruit in the Sydney market must be well known to the members of this Conference, so it is needless to enter into details, beyond saying that it often takes two days to sell a load of fruit. The system which is in vogue in New York and London should be carried out here. An auctioneer appointed by the municipal council, as in the case of the fish market, is required, who would hold a sale every morning, and if the owner found the price too small he could withdraw his fruit and dispose of it as at present. This method would bring all the buyers together, and result in a great saving of time to the growers. Fruit could be sold by sample. This is a system which would require to be worked up; but once firmly established it would prove of great benefit to both growers and buyers.

Exportation.

Fruit is only now becoming of commercial value, since it bids fair to become an article of export. An export trade is required to develop fruit-growing into an enormous industry. The difficulties of picking, packing, and selling having been overcome, the sole trouble now lies with the steam transit companies in taking proper care of the fruit on the voyage. But, as in the case of the shipping of meat to England, the first attempts were complete failures, so this will require time and many attempts to be made before the same measure of success will be attained. Those who exported fruit to England in 1887 were disheartened on account of the shipping company allowing the fruit to become frozen, which rendered it worthless on being taken from the cool room. If a medium temperature of 45 deg. to 50 deg. were kept, fruit could be landed in London in prime condition. Fruit-dealers in England are reported to be arranging to send out special steamers for Australian fruit. Their efforts in helping to develop a trade with the Colonies should be met by co-operation on the part of fruit-growers, so that regular shipments may be made. I look forward to seeing a large trade carried on between New South Wales and New York, for that city imports annually 3,000,000 cases from the Mediterranean, or four times as much as London does. During the months of August, September, and October, the period during which we could export, the New York market is bare of oranges. Every orange-grower admits that it would be well to thin the crop in June or July, as by so doing it would greatly decrease the number of windfalls, and those left on the trees would attain a much better quality. July or August would, therefore, be good months for sending to New York, as the fruit would be safe to realise good prices. The vessels that conduct the fruit trade with the Mediterranean are as large as our best coasting

Digitized by Google

steamers. These are laid up during the three "off" months of the year. An immense stimulus would be given to our fruit-growing industry if these steamers could be prevailed upon to come to Australia in June and July. As the voyage could be accomplished in four or five weeks, there should be no difficulty in landing the fruit in perfect condition, and the effect that would be produced by a fleet of these fast steamers carrying off half the product of our orchards may be conceived. In conclusion, I will say that the growing of an orchard involves great outlay, supplemented by many years of waiting, and a considerable amount of care, labour, and anxiety. But I think that the toil and labour demanded only serve to increase the ardour of the planter, and to double his pleasure when the trees are brought into full bearing. Some people think to escape the years of waiting by purchasing an orchard already in bearing, but in these cases they often pay pretty heavily for the privilege of skipping the preliminary operations, for they may find "that the work has practically to be done over again." Fruit-growing is an industry suited to the most intelligent of men; and where the results of skill and thought are brought to bear on the culture of the trees, and on the manipulation of the fruit, the results obtained from fruit-growing will be almost incredible. But, apart from the actual profit, there should be considered the immense amount of employment that would be provided when companies would be formed for the packing, preservation, and exportation of the product, all of which demand an amount of labour sufficient to make fruit-growing a great national industry.

The present state of Fruit Cultivation, and the best means of improving it.

J. GELDING, Sydney.

THE present condition of fruit cultivation, and how to improve it, necessarily requires much consideration. In old colonial days, when forests abounded, and when orchards were sheltered from the rude blasts of Boreas, and when fruit supplies and fruit demands were of a limited character, the then existing condition of fruit cultivation was no doubt sufficient. Unfortunately for that style of fruit cultivation, matters have entirely changed; clearings have become so excessive that in most fruit-growing districts natural tree windbreaks have nearly ceased to exist, and the soil and trees have now to undergo troubles that in former times they were exempt from. The strictly professional man, journeying about with a keen sense of investigation, generally comes to the conclusion that orchards are planted without any respect to suitable situation or soil, and that the proper positions are not allotted to the different varieties of fruit-trees in the orchard. Thus, the present mode of action seems to be to select land, plant trees, and trust to Providence for good luck or otherwise. Unfortunately, good luck does not generally result, as what with bad selection of land, bad tillage, and bad planting, a few short years soon prove the fallacy of the present system of orchard-planting. To my mind the absurd system of ploughing land to the depth of 6 in. or 8 in., having about 8 in. of fair soil, with a heavy clay subsoil, is one of the worst features of the present system of fruit cultivation. Again, it is a strange but a true fact that every one appears to follow the practice of another. As an illustration of this practice, multitudes of trees of black cluster damson, black Hambro' grape, one or two kinds of apricots, a few kinds of apples, and other fruits are planted; hence, as many who know little about orchard work are now engaging in this department,

Digitized by Google

they find the markets about mid-season, when all of these particular sorts ripen, so much glutted as to make it hardly worth while gathering the fruit. The fact that we now rarely find in our markets really good peaches and nectarines is an unsatisfactory indication of the state of our fruit cultivation. The reason is that quantity, and not quality, is sought after by the majority of our growers. I believe I am stating a fact when I mention that Mr. Reedy, of Camden Park, makes the cultivation of good and late fruit a speciality, which always commands good prices in our markets, and others need only to follow his example to do likewise. The indiscriminate planting of orange-trees in soil totally unsuitable is very unsatisfactory, and has but one ending, and that is, death in the course of a few years. In the present condition of fruit cultivation insect pests are spreading to a rapid degree, and only partial efforts are made to eradicate them. Those who have studied the question well know that the majority of insect pests are much encouraged and propagated by slovenly cultivation and want of continuous attention. With regard to culture of land, it is but fair to assume that if a thing is worth doing it is worth doing well. It was only a week or so ago that I visited an orchard along the Western Line, the proprietor of which was having his ground trenched, and only regretted that he did not do it before the trees were planted. A very material difference existed in the appearance of the trees in the land thus operated upon and of those in the land not trenched. Thus, no better illustration could have presented itself to the observer of the necessity for trenching lands which, like the majority of our orchards in the county of Cumberland and elsewhere, have stiff clay subsoils. By those about to plant orchards, and even by those who have orchards in which trees are not doing well, the expediency of trenching should be well considered. I have always maintained that it is better to have 1 acre of trenched land than 10 acres of untrenched land planted with fruit-trees, as with the trenched land the proprietor may feel confident that his labours will be rewarded with success, and even should he fail to attain his ends he will have the satisfaction of knowing that he failed through no fault in tillage; whereas, he who imperfectly tills his land, when his trees fail, generally blames himself that he did not do the right thing in starting. An investment in the way of fair trenching and draining will amply repay itself. We live in a climate of great changes; and, during droughts, roots descend to obtain moisture, and when much rain comes they get too much, and quickly decay; hence the necessity of good tillage and drainage. Vine-growers find it incumbent to trench the land for that crop. If it is a necessity in that case it must surely be a necessity in all other cases. Of course there are lands having a free gravelly soil, and lands having a sandstone substratum, in which cases, providing the land is sloping, trenching is not of so much importance; but even here fair deep trenching will materially improve the land, and make it yield better results. Let us start with the selection of land suitable for fruit-tree cultivation. All low-lying land, unless it can be well drained, should be discarded as totally unsuitable for that purpose. The young trees may do well for a short time, but the period of tribulation is sure to come. The next worst selection is hilltops, for here, as soon as the trees gain a little height, they are subjected to all the winds that blow. Such orchards generally soon end in a failure. Sites in the coast districts and mountains, having a southern and western aspect, should also be discarded, as here they are subjected, even although the soil may be sloping, to harsh winds, which must play sad havoc with the trees and young fruit. The best sites are those having an aspect from east to north, with fair sloping land, of which multitudes of sites can be obtained

Digitized by Google

in situations near good markets. To ensure success in fruit-growing, all these matters must be duly considered, otherwise the investor will be sure to come to grief. No matter in what position the land is, it should be the aim of the planter to always have a protecting belt of trees, as wind generally, no matter from what quarter it may blow, has rather an ill-effect on fruit-trees. With respect to the selection of fruit-trees, I have already noted the proneness of young orchardists to imitate their neighbours in planting the same varieties. I have often wondered why, in localities famous for such fruit as apricots, peaches, and plums, any but the best marketable varieties are allowed to grow. In my opinion, it only requires personal experiments to teach each individual grower the sorts best for his own soil and climate, and the sooner growers get out of the "follow-my-leader" style, the better. Why should not our markets be well supplied with home-raised plums of such varieties as Washington, Golden Drop, New Orleans, Prince of Wales, &c., also with the better class of apricots and other stone fruits, when we have a climate far more suitable than those places that produce the ordinary varieties found in our markets?

Coming now to the question of colonial seedlings, and taking the apple as an example, we shall have to raise varieties that must be blight-proof, as, even with our advanced method of grafting on blight-proof stocks, the woolly aphis nuisance is intolerable. It is not by picking up chance seedlings that we can hope to raise good sterling varieties. We must artificially fertilise, and see that the bees do not undo our work. We have varieties as the Irish Peach, Winter Majetin, Northern Spy, and a few others that might be cross-fertilised, and yield quite dissimilar but really excellent varieties. There is no reason why, by the same process, all other kinds of fruits should not be produced in other varieties, possibly more suitable for the climate than the majority of those at present cultivated. Here, however, caution must be exercised, as the indiscriminate planting of seedling fruit-trees causes much annoyance and much disappointment. All new-raised fruit should be submitted to competent authorities for test and examination, and in the experimental gardens, which I presume the Agricultural Department will establish, these new fruits should be further tested, and faithfully reported upon; when such action takes place we may say our fruit-growing industry is on the right track. Another way in which to improve the cultivation of fruit is by a proper method of planting. There is a vast difference between sticking a tree into the ground and planting one. It is not every one who can plant a tree properly. All roots should be evenly spread, and any root having the appearance of a tap should be cut away, and when the finishing shake has been given, the collar, or, as it is termed, the crown, should just be level with the surface of the soil. To plant deep means, with the majority of trees, ruination. Amateur orchardists have a hankering after large trees for planting. No objection could be raised to this, providing that large trees had a large mass of roots, but it just happens that the largeness generally consists in tops; and if such be planted it is easy to foretell the result, as it is impossible for top-growth to succeed if the tree has not a commensurate amount of roots to support such top-growth. This being the case, better for all parties to plant good, strong, healthy trees, even although they may not be large. I was, and am still, a great advocate for keeping trees in a moderately dwarf state, for these reasons—that bird pests may be more easily kept away, insect pests may be more under command, pruning may be more easily accomplished, and by judicious summer-pruning fruit may be obtained quicker than by allowing trees to become large standards. It should be the object of the department to tutor our present and future orchardists to try

Digitized by Google

this system, and I feel bound to assert that success will be secured. I have frequently advised growers of the necessity of summer-pruning, yet very few appear to follow those suggestions. The consequence is that in fair seasons the trees make very great growth, and the pruning-knife has to be used in the winter very severely, with the result that in the following season great growth again takes place, and so on year after year, with the result that trees form wood instead of fruit-spurs. Now, let us consider how summer-pruning acts: When the shoots (say) are 6 inches long, they are stopped, laterals are produced, which in most cases will be fruit-spurs, and the more the shoots are stopped during summer growth the more will fruit-spurs be produced, and the quicker will the orchardist get returns. No matter what kind of fruit-tree it is, this summer-pruning process should be religiously observed. No one cares to plant many pear-trees, owing to the old cry, "That he who plants pears, plants for his heirs." It has been demonstrated that if quick-growing varieties, as the Jargonelle, &c., are planted, and after three or four years are headed down, and grafted with good varieties, crops of fruit will quickly be produced. Our orchardists should specially act on this rule, as pears generally fetch a very high price, and when trees come into bearing they generally continue to bear every year consecutively. I am of opinion that all pruning should be done during the growing season. May I also take the liberty of directing attention to the now almost universal use of pruning-shears. If I mistake not they are a foreign introduction. Well, in my opinion, it is a pity the foreigners did not keep them, as no one can gainsay the fact that no matter how good these shears are they mangle more than prune. The only thing that can be said in their favour is that they are easier and quicker to work than a knife.

How to further improve the present condition of fruit cultivation.

Well, in my opinion, each county should have its experimental station, in which should be planted general collections of fruit-trees, to be tested by careful observation. The heads of these local branches should in time be able to report as to the varieties most suitable for the different divisions of the Colony. This subject is of great importance, as what will do near Sydney may be totally useless for the interior. In bringing my subject to a close, I may state that in consideration of the large acreage of fruit under cultivation, and our limited population, we have nothing to be proud of in having to get our winter supplies from other colonies. This may arise from the fact, as I have stated, that our growers, or at least a great number of them, cultivate the same kinds of fruit-trees, and do not depart from the beaten track by growing varieties that will come in during the winter months. Fruit cultivation requires a great reformation, and I hope that my paper may at least have the effect of causing growers to consider whether they have hitherto followed the best possible course as to selection of site, tilling, planting, choosing the best kinds of fruit, and other matters necessarily incidental to the successful cultivation of fruit.

Fruit Cultivation.

JAS. PURSER, Castle Hill.

THE following are the results of twenty-five years' experience in fruit-growing:—

With reference to the cultivation of the orange and lemon.

The land, if possible, should be undulating, sloping to the east, north-east, or north, and free, or nearly so, from frosts, as severe frosts in winter are detrimental

Digitized by Google

both to the tree and the fruit, the latter being robbed of its flavour, and thus unfit for packing purposes. The district in and around Parramatta is most suitable for the cultivation of the orange, the lemon, and all kinds of stone fruit. A loamy or a friable soil is most suitable for the growth and for the quality of the orange. This kind of soil is the very best for producing a first-class quality of fruit. This is a point which is at the present time much overlooked, or I might say neglected, but which will in the future prove the one most profitable with the most growers. At present it is quantity they appear to be looking to, and not quality. I shall dwell more on this point further on. I have seen other soils than those mentioned, such as black mould and soil of a friable clayey nature, produce fair fruit; but then the work of cultivating such has been much greater, and necessitated a larger outlay. Loamy soil needs trenching no more than 12 to 15 inches deep, because such surface soil generally has a gravelly sandstone or shaly subsoil, which needs little or no underground drainage, surface-draining being sufficient.

In preparing the soil the land should be trenched to the depth mentioned six or twelve months previous to planting; and in the meantime cross-ploughed, well harrowed, and rolled until the ground is well pulverised and sweetened. Then take the plough and make a ridge for the trees, say six furrows, at the former depth.

The great mistake with many—who are generally in a hurry to plant—is that they neither get the land in good order, nor allow the atmosphere time to do its part of the work in preparing the soil, which is a matter of great importance for the proper growth of the tree. After the land is so prepared it should be pegged out by means of lines crossing one another at right angles, and at the distance apart at which it is intended to plant; the distance which I prefer is 20 feet.

The stakes should be driven in tightly, and a little bone-dust worked in around them with a fork. In about a fortnight's time the soil should again be well worked with a hoe, and this should be done four different times, to allow the atmosphere and manure to act on the soil and prepare it for the reception of the young tree. If the trees do not get a good start they are likely to become stunted, and bear fruit of an inferior quality.

The hole should be opened around the stake, 6 to 9 inches deep, according to the size of the tree, and great care should be taken in separating the roots and placing them nicely round the stake. A little mould should then be placed over them, and gently pressed down with the feet; after which the hole should be filled in, leaving the surface untrodden, so that the atmosphere can act upon it.

A piece of old rope or stringy bark should be tied round the stake, and then round the stem of the tree, leaving a double knot between, which will prevent the tree from being rubbed against the stake.

The point of the greatest importance to an orchardist is the selection of the most suitable varieties of trees. Although he may use great care in selecting a first-class site with a good aspect and superior soil, and pay every attention to proper manuring and cultivating, all will be of no avail if trees which will produce good marketable fruit are not planted.

Many orange-growers in the past have paid but little regard to the kind of tree so long as it was an orange-tree, and hence the reason that at the present time there are so many thousands of cases of the common orange commercially worthless. Generally speaking, the trees have been raised only for sale, regardless of the quality of fruit they will produce; and this is probably owing to the nurserymen's desire to supply the large demand constantly made for fresh plants. Owing to the custom of grafting the orange upon

LIBRARY
DEC 29 1890
AGRICULTURE.
Digitized by Google

the lemon, and putting scions from those on other lemon stocks, and so on in rotation, the orange has deteriorated in quality, and in some instances become little better than the lemon itself. Not only, too, is the fruit inferior, but, like the lemon, the orange-tree becomes more susceptible to diseases of all kinds. The only way to remedy the evil is by propagating from real orange stocks, doing away with the lemon altogether. It has been proved that this is preferable, both as regards growth of the tree and the quality of the fruit. In America, of late years, the growers have discarded the lemon stocks, and have found the orange-grafting very satisfactory. The reason why lemon stocks have been used to such a large extent is that for the first two years they grow much more quickly than the orange, and so the returns are obtained much sooner, but in the end the orange graft will far surpass the lemon in growth.

Another good way of propagating this tree is by layering. In my orchard at Castle Hill there are some trees which were layered twenty-five years ago, from trees which had been layered from old seedlings more than a score of years previous to the time mentioned. The fruit of these trees is large, of a superior quality, and always fetches a good price in the Sydney market. Deciduous fruits should always be propagated from the best varieties, and great care has to be exercised in training and cultivating the young trees. The pruning of all classes of stone fruit-trees, as well as of all others, should be done by an experienced hand; for it is of the utmost importance for the pruner to know when, how, and what to cut off or leave for the production of fruit-spurs, and for the growth, symmetry, and uniformity of the tree. The fact that different kinds of trees require different methods of pruning must not be overlooked, for by injudicious pruning the trees generally become stunted, and produce fruit of an inferior quality. During the first three years of their growth it is a good plan to prune apple, plum, and apricot trees three times a year. The whole question of pruning could not be dealt with in a paper like this, but I would like to impress upon the orchardists and those intending to become interested in the fruit-growing industry, that it requires careful observation and long practice to become a proficient pruner.

History and Culture of the Orange.

THOMAS PYE, Seven Hills.

This paper treats of the orange as grown in New South Wales. The first orange-trees were grown by a man named Joyce, who obtained from the Crown a grant of land at Seven Hills. Mr. Joyce (who was evidently a practical gardener) brought with him to this Colony seeds of the orange, lemon, apple, pear, plum, apricot, and loquat. He was successful in raising trees of all the kinds above mentioned, some of which, now over eighty years of age, are still living, and are annually bearing heavy crops of fruit. Joyce's grant was purchased by my father (the late Mr. James Pye, of Rocky Hall, Parramatta) over sixty years ago. The first plants reared from the original trees were propagated by my late father by seeds and layers, and were planted at Baulkham Hills and Seven Hills. From these trees others were propagated and planted throughout the district, the price of these plants at that time being 7s. 6d. each. The oldest orange-trees at the present time in this Colony are at Rocky Hall, near Parramatta, and are universally known as some of the largest in the world. They are seedlings from the original trees grown on Joyce's grant, now my property, and known as Maryville Nursery, Seven Hills. The butt of one of these

Digitized by Google

orange-trees was sent to the Paris Exhibition, and measured 2 feet 9 inches in diameter, the tree from which it was taken being about 50 feet in height, and having borne over forty cases of oranges in one season. Seedling trees being so slow in bearing, and layers being difficult to obtain, budding and grafting were resorted to as the better means of propagation, and for the last thirty years orange-trees have been propagated by these methods, seedlings being seldom planted, and layers unprocurable. During that period I can confidently say that I have individually propagated by budding and grafting more trees of the Citrus family than anyone else in New South Wales. I have grafted as many as 1,060 plants in one day, and frequently budded over 100 plants per hour. For the last twenty-five years I have been experimenting as to the best means of the propagation and improvement of the orange, and have been successful in producing one of the finest oranges grown in the Colony, called "Pye's Acme"; also the "Holdfast" orange, which never falls from the tree, ripens in December, and sells in January and February, at never less than £1 per case; and the white orange, which ripens before all other kinds, is an immense bearer, and is every year sold, before other oranges are in the market, at 9s. per case. To show the enormous returns from orange-trees a few years ago, I may mention that £200 were obtained by my late father for the fruit from twenty Thorney mandarin-trees. They averaged ten cases per tree, and the price was £1 per case; also the same amount, £200, was got for the fruit on twenty Lisbon lemon-trees. I myself have obtained as high as £1 12s. 6d. per case for Lisbon lemons, and £1 7s. 6d. per case for oranges, such prices being exceptional. Fruit-growing at the present time is far from being as remunerative as in the past, from the fact that fruit of an inferior quality is being grown, and to make it a profitable speculation it is imperative that fruit of improved kinds and superior quality only be grown. I have pleasure in stating that the Government in the past took active steps to benefit the fruit-growing industry in this Colony. Some twenty years ago Mr. Chas. Moore, Director of Botanical Gardens, Sydney, was sent by the Government to the various fruit-growing countries to obtain information concerning diseases, culture, and varieties of fruit. Mr. Moore brought to this Colony, on behalf of the Government, eleven different varieties of the Citrus tribe, all of exceptionally good quality—one in particular, a navel orange, which is a regular and heavy bearer, the fruit thin-skinned, and superior in flavour to any orange grown in this Colony. My late father, being the oldest and most successful fruit-grower, was presented by the Government with plants of each of the different varieties, and from those plants I have, on behalf of my father and myself, successfully propagated upwards of 100,000 plants, which are now distributed throughout this Colony and Victoria. The largest orangeries are in the district of Seven Hills, notably the orchard of Mr. E. H. Pearce, who is the largest and most successful orange-grower in the Colony. His orchard is upwards of 500 acres in extent, 300 acres of which are in bearing, and for the fruit on the trees this year he obtained the sum of £4,000. I may state that a great part of Mr. Pearce's orchard consists of young trees just bearing, about three or four years old. The Pearce family in this district alone own considerably over 1,000 acres of orange-trees. Mr. E. H. Pearce has pulled from ten acres of orchard as much as eleven cases per tree. Mr. M. Smith, of Seven Hills, has an orchard upwards of 100 acres in extent, which is a marvel of perfection. The trees are heavily laden with fruit, free of disease, and of superior quality—not one bad tree in the whole plantation. On application to me anyone interested in fruit-growing may view these orchards, and obtain all information as to their cultivation.

Digitized by Google

Culture.

Having the benefit of my late father's sixty years' experience in the culture of the orange, together with my own of twenty-five years as a practical grower, I trust that my advice may be beneficial to those about to plant an orangery. The climate of Cumberland is admirably adapted to the growth of the Citrus tribe. The first thing to be taken into consideration is to obtain suitable land. The best criterion of suitable soil is where we find forest oak, blackbutt, apple-tree, stringybark, and gum-trees predominant; the surface soil of such land is, as a rule, light, and the subsoil porous. Orange-trees may be successfully grown on any land which is not too stiff and retentive, nor too low-lying and swampy. Having chosen your site, which should, if possible, have an easterly aspect, it is then necessary to clear the land in any of the ordinary ways, always taking care to leave a belt of timber on all sides, as a windbreak, the best trees for that purpose being those natural to the soil. In large plantations of (say) 50 acres I would advise two plantations of 25 acres each, with a belt of timber running north and south between them, to act as an additional windbreak. The next process is to prepare the land for planting. The best method is to plough a strip in the centre of each land, in which the trees are to be planted, 8 feet wide and 6 inches deep; then harrow, roll, and plough again; continue to plough, harrow, and roll, until the strip is in a fit condition to plant. The land should be then staked in the ordinary manner for planting, at distances from 22 feet by 20 feet to 30 feet by 40 feet, according to the quality of the land—the richer the land the greater the distance. Next, manure each hole for the reception of the tree, the best manure being well-rotted farm-yard manure, about three or four shovelfuls to each hole, spread over the surface, and dug or forked under. The rest of the land may then be ploughed, either before or after planting, and done in the following manner:—The first two furrows on each side of the strip all ready ploughed should be ploughed 8 inches deep, the next two furrows 10 inches deep, next two furrows 12 inches, and the last two furrows 15 inches deep, the last furrow forming a surface drain 15 inches deep. The land being now ready for the reception of the tree, we come to the choice of plants. Great care and judgment are required in the selection of good plants and suitable kinds, and every buyer should have a written guarantee that all plants are true to name and description as per catalogue. Choose young, strong, healthy plants, of a natural growth, well supplied with plenty of fibrous roots, and avoid all forced plants. The best kinds of plants are seedlings and layers, or plants budded on common lemon and common orange stocks (but never use Seville orange stocks, as they have proved a complete failure). The best of these for general use are trees budded on lemon stocks. Trees worked on the lemon stand transplanting better, are hardier, root better, and grow faster than trees worked on the orange stock; they also bear heavier crops of fruit. The best oranges I have ever seen I have now growing on common lemon stocks, the fruit being the first crop the trees have borne, samples of which are now on view at Ferguson and Sons, Royal Arcade, Sydney. I have at the present time fifty-six different varieties of the Citrus tribe, consisting of oranges, mandarins, lemons, citrons, limes, shaddocks, pomelloes, and looms, and it is my intention to exhibit the whole of this collection at the next Agricultural Show held in Sydney. The most suitable varieties for commercial purposes are the following:—True common orange, Siletta, imported Navel orange, Seville orange, Emperor mandarin, Thorney mandarin, Lisbon lemon and citron.

Digitized by Google

There are four new varieties of oranges which I consider vastly superior to the older kinds above mentioned, viz., White orange, Pye's early Acme orange, Holdfast orange, and Pye's late Acme orange, which new kinds sell readily at 2s. 6d. per plant, while the older varieties are seldom sold at more than 1s. 6d. each. With land ready, and trees purchased, you now proceed to plant as follows:—Open each hole for the tree 2 inches deep, prepare the tree by heading back in proportion to the quantity of roots lost in removing from nursery; remove all injured roots, and make a clean cut at the extremities of all roots. Place your tree in hole close to the stake (but do not remove the stake), taking care to plant all your trees on the same side of stakes, so that, when the stakes are ultimately removed, your trees will be perfectly straight. Every tree should be planted so that there are three distinct layers of roots, with a layer of fine earth between them, the roots being spread in all directions from the tree outwards. The crown, or top layers of roots, will now be above the level of the land; it is then necessary to make the soil firm round each tree, each hole being finished off in the form of a mound. Each hole should be mulched, bush leaves and rakings being the best for such purpose; the benefit of mulching being to keep the land moist and the roots cool during the following summer. Never, under any circumstances, water newly-planted trees. When the season is too dry for planting the better plan is to well water the holes a week previous to planting, and have the holes reworked. I have known many orchards ruined in the first instance by the injudicious use of water—few persons having the slightest idea of irrigation. The best time to plant the Citrus tribe is the second week in August for spring planting, and the first or second week in February for autumn planting. I always advise my customers to plant in August, and have very frequently refused to supply trees during winter months, for which refusal, in years after, I have been repeatedly thanked. My reason for planting in spring and autumn is that at those particular seasons the growth in trees of the Citrus become active, and I have always found trees so planted succeed better than when planted in a perfectly dormant state. All the pruning afterwards required is to keep the centre of the tree well open, and the top and branches evenly balanced, as trees of the Citrus tribe bear their best and finest fruit on the outside branches. In manuring, use only sufficient to keep your trees in a vigorous and healthy state, and be careful not to create a forced growth, which ultimately becomes injurious, rather than beneficial. I would recommend all animal manures where procurable, for by the use of such your trees take a natural growth. Where such manure cannot be obtained you must, of necessity, have resort to artificial manures. I have tried all the different kinds, and find the Colonial Sugar Co.'s fertilizers Nos. 4 and 5 and Peruvian guano the best wherewith to manure bearing trees, to produce good fruit. Any of the various artificial manures may be used with young trees up to time of bearing. The *best* manure for producing good fruit is surface soil or decomposed vegetable matter, one cartload of which is sufficient per annum for a tree in full bearing. After trees are planted the cheapest and best system to work the land is to plough and harrow between the trees, and work the strips not ploughed with forked hoes. In a few years, as the trees become large, the best plan is to break up the whole of the land with forked hoes once a year, as deep as possible, without injuring the fibrous roots, and harrow as soon as the land is dry enough, after every rain, for by so doing you leave the land loose on top, thereby preventing the growth of weeds until the next fall of rain. The insects that infest the Citrus tribe are,—white coccus, red scale, black bug, large borer, small borer or brown beetle, and black aphis. The

Digitized by Google

trees are also affected by black smut. The best insecticides are,—Gishurst Compound (which, I regret to say, is too expensive to use on a large scale, but I would recommend it to be used on all young plants); and a soap sold by Mr. D. D. Henderson, of Parramatta, I have found to be the best and most effective of all soap solutions. It is sold in kerosene tins, at the rate of 4s. per tin, and the contents of one tin will make 100 gallons or more of solution. This mixture is death to all insect life, and the only solution I have ever found to clear the scale from the fruit. The best method of applying the solution to trees already affected with disease is by means of a sprayer. As prevention is better than cure, I would advise washing the barrel and main limbs of all trees twice a year from time of planting, for by this means the insects are prevented from reaching the branches. As it takes from five to ten years to educate oneself sufficiently to successfully grow the orange, I would advise intending orchardists to obtain the best land in the districts of Seven Hills, Castle Hills, and Dural; also to obtain their trees from nurserymen of good repute; and above all to accept the advice of practical men of long experience. I have frequently given advice to those about to plant, and some of the finest and most remunerative orchards in the Colony have been grown under such directions, and I will deem it a pleasure at all times to show these orchards to those about to plant, and give them similar advice. I am often asked how soon after planting will trees give a return, and for the benefit and encouragement of those interested, I now conclude this paper by stating that an orchard planted by me for a gentleman at Castle Hills, consisting of oranges, lemons, and mandarins, when 3 years old, gave a clear return of 4s. 6d. per tree. Another orchard, planted at Riverstone, gave a return of £60 per acre at five years old; and as much as £200 has been obtained for the fruit from 1 acre of trees six years old grown in my own orchard.

Fruit Cultivation in New South Wales.

W. STIEME, Fairfield.

I VENTURE to think that a few plain hints on the nature of the soil and the climatic and other conditions under which alone fruit cultivation can be carried on successfully and in a remunerative manner in New South Wales will not prove unacceptable to this Conference. I shall confine my brief remarks to a few of the more important varieties of fruit only.

The Orange (*Citrus aurantium*).

The orange is a native of Judea and some other portions of Asia. The tree, in its natural state and under favourable conditions as regards soil and climate, is exceedingly long-lived. Trees are known to have flourished for periods varying from 200 to 500 years. It is a well-authenticated fact that there is at Versailles an orange-tree known to have reached the age of 500 years. At Potsdam, in the Imperial Gardens, there is another orange-tree, designated "Frederick the Great," fully 200 years old. Among the more prominent varieties suitable for cultivation in this country may be named the St. Michael, Siletta, St. Jago, Tahiti, and the common Navel orange.

Generally speaking, the orange will succeed well in a semi-tropical climate. It requires a deep red soil, with plenty of vegetable matter to feed upon, the root of the tree being nothing but a mass of fibrous matter; therefore, mulching will prove beneficial. The situation should be sheltered; the tree will

Digitized by Google

flourish neither in high exposed hills, nor in low-lying gullies. In the latter case there is great danger of the roots rotting in abnormally wet weather. The sheltered sides of hills and gentle slopes suit the orange-tree best.

It must be confessed that in Australia orange culture has, save in exceptional cases, resulted in partial failure. Whilst this is to some extent traceable to the conditions of climate, which are such as to limit the duration of its life in Australia to, say, thirty or forty years, the fault lies partly also with the system of cultivation, which may be described in the majority of instances as a "take all and give nought" system. Among the natural conditions which affect the well-being of the orange-tree may be mentioned the sudden changes of temperature, the long-continued periods of dry weather, and the periodical recurrence of very wet weather. The latter forces the tree, producing an exceedingly heavy mass of blossom, and an equally heavy crop of oranges of an inferior character, which are calculated to exhaust the powers of the tree. Sudden climatic changes are invariably injurious to the orange-tree. The first sign of decay is presented by the roots becoming affected. Generally, the tree, if on the road to premature decay and death, will, in a last struggle, bear for one or two seasons extraordinary crops, but will at length die from exhaustion.

Careless or erroneous grafting is also a very fertile source of the premature decay of this tree. I allude to what is termed "back-grafting," where the scion is cut in an oblong shape and placed in the bark of the stock. By this process the scion only gathers around the bark of the stock, and forms no real union from wood to wood. In certain seasons the sap is thus prevented from rising up the tree, which starts gumming near the graft. If this gumming is not carefully looked to at first it will prove effectually fatal to the tree. The spot where the gumming starts should be carefully cut out to the sound bark and wood, and a plaster of beeswax or cowdung and clay placed on it.

In a natural state the tree will live thirty or forty years in this country, but nature may be assisted to such an extent that life may be prolonged for twice that period if not longer. I am of opinion that the following mode of cultivation will tend largely in that direction:—Suppose an orchardist has from 5 to 8 acres planted with orange-trees, and that these trees have attained the age, say, of ten years. One acre of trees should be pruned annually to the extent of at least five and twenty per cent. all over the tree in the branches. Further, the soil should be loosened deeper than is usually done. In this way the roots would be pruned and disturbed. Plenty of vegetable manure with, if possible, one load of soil to each tree should be worked in. It will be found that by this means the tree will produce fresh and vigorous shoots and new wood, the old wood becoming exhausted and dying. A short rest from bearing would be secured, and the constitution of the tree benefited and, in fact, renewed. Orchardists will find that, although the method recommended may cause trouble, that trouble will be more than amply repaid.

Citrons (*Citrus medica*), *Lemons* (*Citrus limonum*), *and Limes.*

The most valuable varieties of the citrons are the Bengal and the common dwarf. They are natives of Asia, and in the natural state attain the age of twenty to ninety years.

Lemons, the common and Lisbon varieties, are the best for cultivation. Lemon-trees live from forty to eighty years.

The West Indian limes are most suitable, if the production of lime-juice is an object.

Digitized by Google

Generally speaking, the system of cultivation of these fruits is similar to that followed in the case of the orange. The Lisbon lemon-tree, however, bearing three or four crops in different stages at one and the same time during the year is more quickly exhausted, and therefore needs special pruning back. It is more tender, also, than the orange-tree, and calls for a more sheltered situation.

Peaches (Amygdalus persica).

The peach-tree is, as the name indicates, a native of Persia. It is also indigenous to Asia Minor, Syria, and China. It is a short-lived tree, its life scarcely ever exceeding twenty or twenty-five years. Among the varieties recommended for cultivation here are the following:—Noblesse (clingstone), Lady Palmerston (freestone), Lord Palmerston (F.), Royal George (F.), Salwey (F.), Italian Yellow (C.), Surbris (C.), Stieme's Seedling(F.), Early Newington (C.), Smith's Late (C.), Mirabel—June (C.), Shanghai —, Early Beatrice, Briggs Red May (F.), Stieme's Nonpareil (F.), and Stieme's Eclipse (F.)

Peaches require a deep rich loose soil. They will flourish most abundantly in a mild temperature, and in situations sheltered from the wind. The tree will grow well in localities 40 or 50 miles west. Peach-trees should be kept low down near the ground to protect the stem and roots from the hot sun. In pruning them they should not be opened out too much, so as to expose the bark to the effects of the sun. The pruning should be carried on from the top downwards, and the leading branches should be cut back, whilst the fruit-spurs should be preserved. The finest-flavoured and best-coloured fruit grows inwards.

It is the practice in many orchards to prune too much in the centre of the tree as is the custom in Europe, but the reason for such a procedure does not hold good in this country. In Europe and in moist countries it is absolutely necessary to open out the trees, as the fruit would not come to perfection unless it were subject to the full influence of the sun. Here, on the other hand, it should be the constant endeavour to provide as much shade as possible. Nectarines, apricots, and plums should be pruned in like manner.

Nectarines.

The following varieties are recommended:—Albert Victor, Elruge, Napoleon, Red Roman, Stanwick, and Scarlet.

The same remarks as in the case of the peach apply in this case.

Apricots.

Generally speaking, apricot-trees require similar treatment to peaches, but they should be cultivated in differently-constituted soil. They flourish better in rich alluvial ground, with a shaly subsoil. In the light deep soil in the neighbourhood of Parramatta the apricot will grow well, but it is a rather shy bearer, and orchardists connot calculate upon more than one good crop in three years unless they have the shaly subsoil.

The Grape-vine.

The majority of species are natives of tropical and temperate Asia, and varieties raised from them succeed fairly well under somewhat similar conditions in Australia. The following is a list of black grapes most suitable for cultivation here as regards commercial purposes:—Black Damascus,

Digitized by Google

Black Hambro, Black Prince, Snow's Muscat Hambro, Champion Muscat, Royal Ascot, Trentham Black, Madresfield Court. White or green varieties:—Baxter's Sherry, Calabrian Raisin, Canon Hall Muscat, Chasselas, Duchess of Buccleugh, Golden Hambro, White Sherry, Royal Vineyard, and Muscat of Alexandria.

Apples and Pears.

A very few words about apples and pears must suffice.

Apples succeed very well in the colder parts of New South Wales. The trees should be kept as low as possible, in fact, dwarfed. Generally speaking, the climate is too warm in summer for them. If the sun can penetrate to the bark it will scald it, and as a natural consequence the tree will dwindle away. In all cases the branches should act as a protection to the trunk. Apple-trees require a light and deep soil. The roots of the pear-tree, having great penetrating powers, it can be planted in heavy or wet soil.

The Suitability of the Gosford District for Fruit Cultivation.

A. HUNTER, Gosford.

THE district of Gosford is well adapted for fruit-growing, both as regards soil and climate. Nearly every variety of fruit can be grown to perfection, but the best for commercial purposes are the orange, the Lisbon lemon, the apple, grape, peach, plum, pear, apricot, and almond, which grow to perfection. There is a great extent of land suitable for the growth of Citrus fruits.

The soil is a rich alluvial vegetable humus, of great depth, and very porous; natural shelter prevails. Irrigation could be available in the greater part of the district, either from natural creeks or shallow sinking, and the greater part is naturally well drained.

Fruits of colder climes could be grown on the mountain tablelands, and water is there in plenty.

Clearing the land is the most expensive item, as the natural vegetation is heavy and thick. The greatest hindrance to settlement is the exorbitant and fictitious price asked for land by the present owners, but the Government price is greatly reduced, and the present high prices will become more moderate as owners' ideas recover from the inflation caused by the opening of the railway, and the consequent speculation. In many sheltered spots around the shores of the Broadwater and Wamberal, Terrigal, and Tuggerah Lakes, semi-tropical fruits would do well, such as cherimoyer, mango, banana, and others; and I would here warn settlers from clearing away the natural shelter, from south and west especially. Persimmons of great size are grown in the district, and these trees bear very heavy crops. Insect pests are less troublesome here than in many places, but the flying-foxes are very destructive, also the wallabies. There is a borer which is very troublesome on the fig, but most places are pretty free from scale, mealy bug, and other pests.

Clearing land is being done on a large scale, with the intention of planting out new orchards, but owing to so much wet weather it has retarded work very much. I consider the Gosford district one of the best for fruit-growing, and believe it has a great future before it, as it now has every advantage of railway and steamer communication with the two great markets of Sydney and Newcastle.

Digitized by Google

Present state of Fruit Cultivation in the County of Cumberland.

W. B. CAMPBELL, Blacktown.

THE present state of fruit cultivation in the county of Cumberland is very indifferent, and in many instances extremely slovenly. Our usual plan has been to give the land a light ploughing, stake it out at about 20-feet distances, pulverise the ground about 3 feet round the stakes, and plant the trees. Then, with an annual light ploughing, and an occasional harrowing or scuffling, trees planted in this manner are expected to produce a living, or perhaps a fortune, for the planter. In many instances, such as when an orchardist possesses exceptionally good land, and when high prices rule for fruit, these expectations have been realised; but we cannot reasonably expect such a mode of cultivation to succeed for any length of time. It is when adverse seasons set in that we see our mistake. Look at the majority of orchards to-day, and the result of our meagre treatment can be plainly seen in the ravages occasioned by the recent extremes of weather—in the first place excessively dry, and next extremely wet. Thousands of our indigenous trees have died under such a severe trial. How, then, can we expect imported and artificially-planted trees to flourish and be productive with so little culture and care. Our soil, commonly known as Cumberland ground, consists generally of about 6 to 12 inches of fairly good loam upon a coldish yellow clay subsoil. This subsoil is hardly ever moved in orchard-planting, and its cold, solid nature repels the advance of young roots, and thus almost confines the tree to the nourishment to be derived from the few inches of surface loam. My experience has to do with the orange-tree and the Citrus family generally, and the prevailing notion of its being a surface-rooting plant I attribute to the plain fact of its inability to do otherwise, having only a few inches of congenial surface ground to feed upon; and were it not that our usually magnificent climate is so favourable to this tribe, our orchards would fade away after four or five years, as they now frequently do it at ten or twelve years old.

This is the present state of fruit cultivation generally existing in the county of Cumberland; the question then comes, what can we do to improve it?

The plan I would suggest to those who are determined to persevere in the old method of planting is simply to place their trees 30 feet apart, instead of 20 feet, to keep the land free from sorrel, couch, and docks, and to have the soft and perishable weeds frequently and well ploughed under. My own plan would, however, be different; I would cultivate a smaller area of land, and do it better; I would plant my trees 20 feet apart, and if the land consisted of (say) 9 inches of loam, with a clay subsoil, I would either hand-trench or plough to a depth of 15 inches. Hand-trenching is more expensive, but much better than that done by the plough, because it leaves an uneven bottom, and the surface loam is better mixed with the clay subsoil. If convenient, it would be a good plan to place a light layer of bush rakings, such as sticks, leaves, and bark, and a small dressing of coarse bone-dust at the bottom of each trench; the loam mixed with a little clay would be thrown upon the bush rubbish, and the pure clay would be on top, where, with an occasional light dressing of bone-dust, say about 2 cwt. to the acre, every year, ploughed in, and the surface always kept well open, the action of the weather would convert it into a fairly good soil. In this stiff clay subsoil I would advocate a drain between each two rows of trees, at least a foot wide and 2 feet deep, and the bottom covered with rough bush timber to a

Digitized by Google

depth of about 6 or 9 inches, then filled in with the loam and clay, fairly mixed. It may very naturally be said, why choose land that requires so much labour. Well, in some cases, it is Hobson's choice—that or none; in other cases proximity to a railway station has an influence; then, again, a good aspect and an elevated position will tempt a man to take up poor country. An orchardist, who is fortunate enough to have the good land, good aspect, and elevated position can partially evade my plan by using the subsoil plough. In planting upon poor ground I would say set your trees high by placing a cartload of good soil on the planting spot, and spread it down to about 9 inches above the level of the land; this will give the opportunity of feeding your trees with new soil in after years, without injury to the main stem, and give more vigour to the growth of the first year or two; no doubt a great deal of the success of the later life of fruit-trees depends upon a healthy vigorous growth at an early stage. As regards the surface-rooting theory I can practically say, give them the opportunity and the roots will go down. In a part of my orchard, consisting of a warm loose red clay subsoil, I have found strong healthy roots of six-year old orange-trees at a depth of 3 feet below the surface; and on the Clarence River, in a deep washed band of alluvial deposit, I have seen the orange-tree roots 15 feet below the surface, and these trees required a very long ladder to gather the topmost fruit.

I feel it necessary to apologise for the extreme simplicity of my paper; it merely touches upon practice without science, a deficiency which I have no doubt will be profitably supplied by able members of this Conference.

Introductory Notes on Vine Culture in New South Wales.

FK. STIEFVATERSEN.

In a lecture recently delivered by me on the above subject the desirability for establishing a nursery or model vineyard has been hinted at. Such an institution would confer benefits to the grape-producing industry, which cannot be conferred with equally beneficial results by any other means. The vine flourishes in semi-tropical and moderate climates, it adapts itself to every variation in soil, climate, and treatment, and in return for the trouble of cultivating this noble plant, nations, communities, and individual growers have been rendered prosperous, in proportion to the degree of enterprise, system, and perseverance displayed in this direction. This fact constitutes a prominent feature in the grape-producing cultivation, and it should not prove difficult to admit the feasibility of my idea when considered in the light of these few introductory remarks.

As commercial nations regard ships, ports, exhibitions, &c., as part of their collective existence and source of wealth, so agricultural communities require similar institutions to foster their particular industries, and if we would stimulate the grape-growing industry we cannot do better then decide upon a well defined plan for bringing grape culture under the notice of agricultural authorities and the general public, in its progressive stages of development, from the time of planting to the subsequent bearing season, when intending growers may obtain from the nursery both plants which cannot disappoint, and reliable instructions which, when followed up, will produce similar results as those produced in the nursery from the same specimens as the grower would be recommended to stock his vineyard with, paying due regard to certain modifications, which local requirements may call for.

Digitized by Google

A central vineyard would represent the home of a great variety of vines. The tilling of soil and mode of preparing it previous to planting, either by means of deep ploughing, trenching, or pitting, is to be determined by the nature of the soil. Deep ploughing, when practicable, is by far the cheapest method, and generally resorted to for cultivating light loamy soil. In selecting land for the above purpose the following points deserve consideration :—

1st. Nature and component parts of the soil.
2nd. Elevation above sea-level.
3rd. Formation of surrounding country, proximity to hills and mountain chains.
4th. Water supply, and means for providing manure either from vegetable or mineral matters.

A nursery so planted should be of sufficient extent to permit experiments with plants grown on the spot, and comprising specimens grown from grape seeds of foreign vineyards, with a view to test their bearing capacity under the Australian sky, without however losing sight of the immediate purpose in view, viz. :—To relieve the grower in the Colony from the task of making experiments at his own cost in regard to :—

1. Distance between plants.
2. High or low trellising.
3. Rules for pruning plants for table grapes.
4. Rules for pruning plants for wine-making.
5. Vines not suitable for wine-making when grown in coastal districts and in alluvial soil.
6. Vines in alluvial soil subject to early after-growth of shoots on young branches, and, therefore, valueless to growers for wine-making.
7. Reliable information as to plants most adapted for cultivation on table-land, with regard to bearing capacity and quality.
8. Annual yield per acre—soil manured.
9. Annual yield per acre—soil not manured.
10. Results in quantity obtained from low trellis.
11. Results in quantity obtained from high trellis.
12. Results in quantity obtained from stake trellis.
13. Results in quantity obtained from four-year old plants derived from cuttings.
14. Results in quantity obtained from yearlings.

If such an establishment were situated on table-land the benefit resulting therefrom would not be limited to such territory only.

The coastal vignerons would derive much additional information of a general character, and more especially so, in regard to the proper treatment of ripe table grapes which growers may not find profitable to dispose of at low market prices. There seems to prevail at present a discouraging uncertainty with small growers on this point, and who might then refer their respective difficulties to the Model Vineyard Office, and obtain instructions how to overcome difficulties, when the density of saccharum and alcohol contained in our bulky table grapes has been exactly ascertained.

A model vineyard properly managed would offer great facilities to intending growers for learning every detail belonging to vine culture and production of sound marketable wines, and I venture to recommend this method of instructing our agricultural population as being the most direct and effectual means towards raising this branch of culture to the full standard which soil and climate seem to have assigned to it.

Digitized by Google

With us it ought to become a national ambition to demonstrate our capability for producing wine in such quantities and qualities as can only be successfully attempted in semi-tropical climates. With intending growers the question as to the annual returns per acre becomes the chief consideration. The model vineyard, once in full working order, must answer such questions by results produced during the vintage, when inquirers may be present, inspect the standing crop, and note the respective quantities of grapes grown on different sections, which when gathered and weighed would enable them to calculate the gross return to be expected from any given area, planted and worked on the same principle.

The question whether and to what profitable extent the production of quantity and quality can be more equally balanced remains to be solved by experiments. As a rule quantity and quality are not combined.

The latter production requires more working capital, therefore the man with moderate means may safely go for quantity, until his accumulated means enable him to extend cultivation by adding suitable superior plants to it; but in order to make these available, a variety of European and Eastern specimens should be generated under our sky.

Lastly, a model vineyard would not limit its usefulness to vine-growing alone; but my notes would cover too much ground if the process for wine-making, storing, blending, and clarifying had to be alluded to. In this respect also the above would prove the proper place for information as from an institution belonging to the country, and maintained for the development of its natural resources.

The present state of Fruit-cultivation, and the best means of improving it.

WM. BRIDLE, Tumut.

In the first place, "as to the present state of fruit-cultivation in Tumut." Tumut, though an old settled district, possessing land admirably adapted to the growth of all fruits not altogether tropical, has made very slow progress in the matter of fruit-growing.

I am not in a position to give statistics as to the aggregate extent of either orchards or vineyards in Tumut, but nearly every landowner there has planted only sufficient trees to meet the demand of his household requirements, and attempts beyond that have not, except in a few cases, been made, for the reason that the local market is the only one the small orchardist or vigneron can take advantage of, while to the others the cost of carriage of fruits by team from Tumut to Gundagai, viz., 25s. per ton, and from Gundagai to Sydney 21s. 8d., leaves such a small margin of profit as to discourage effectual attempts in this direction. A neighbour of mine, Mr. Joseph Darlow, has about 8½ acres, under trees of all varieties, and last season, beside supplying his share of local requirements, sent 30 tons to Sydney. He does not complain of the railway charges; but the fact of his having to pay 25s. per ton to Gundagai (only 20 miles distant) practically shuts him out of the market.

My own experience leads me to coincide with him, and the want of capital, necessary information, and proper knowledge, coupled with cost of transport, has, so far, prevented all attempts at the establishment of a canning

Digitized by Google

factory, by the aid of which, what is now too frequently allowed to rot might be turned to profitable account.

Grapes prior to the appearance of that destructive scourge, the *Oïdium Tuckeri*, grew luxuriantly, and even now, when sulphur is periodically applied, satisfactory results are obtained.

Wine-making has, in some few instances, been tried, with good results, but since this disease attacked the vine few have given it proper attention, and those who do find a ready sale for their fruit for table purposes.

On the whole, in no part of the Australian Colonies have I seen finer or better flavoured fruit. "Bardwell" apples and pears of the winter variety attain a weight of from 2½ to 3 lb. each. Peaches, plums, quinces, cherries, nectarines, apricots, figs, mulberries, raspberries, gooseberries, strawberries, &c., grow as though indigenous, and suffer less than in other places from the attacks of aphides, moths, lichen, or other pests known to the observant gardener. As a consequence, the majority of our fruit-growers have done little towards their extirpation, and in fact the present action of the Government, in their attempt to educate the people of New South Wales as to the importance of the fruit-growing industry, and its possible development, will most assuredly be hailed with delight, not only by the amateur but the practical and scientific gardeners of the Colony.

In the next place, "As to the best means of improving the industry." My remarks under the first heading embody, in a measure, the suggestions I am now about to make with reference to the subject.

Tumut, with its great drawback in not having direct railway communication with the metropolis, will never advance to that position as a fruit-growing district which its many advantages, such as climate, excellent land of all descriptions, position, and facility for irrigation, entitle it to, unless the branch line of railway from Cootamundra to Gundagai be extended thither. Fruit, however good, cannot be sent to Sydney under existing circumstances, to pay, neither would it be possible, for the same reason, to establish (with a prospect of success) jam factories, on account of the carriage on sugar.

Hints as to the propagation of trees, by grafting, budding, layers, &c., application of manures, pruning, irrigation, destruction of insect pests, &c., are all of secondary consideration, and of little avail, unless cheap transit to an unfailing market is afforded, or, by it, opportunity given for the introduction in Tumut of fruit-preserving, and the economic utilisation of the products of the orchard, &c.

In conclusion, I give it as my opinion, based on the experience of forty years in the district, that Tumut, for fruit-growing capabilities, stands through the varied character of its soil and situation superior to any part of the Colony, and with ready access to market is destined to become, in the not distant future, noted, not only as the granary but as the fruit-garden of New South Wales.

Fruit Cultivation and the best Means of Improving it.

GEO. H. WILLIS, Corowa.

I HAD no intention of contributing a paper on this subject, but I find, by what I have read, that our Colony is so wide and extensive, and the soils so varied, that I would be failing in my duty as coming from a quarter—the Corowa district, distant about 400 miles from Sydney—where the soil and

Digitized by Google

climate differ from those of the districts of which we have heard from the delegates who have already spoken. Our soil consists of deep chocolate sandy loam and sand of a lighter nature. The first thing we have to consider in our quarter is: Will fruit-growing pay? If we had to go to the expense of the trenching, &c., we heard of from Mr. Gelding, my answer is that it would not; but with our soil, as a rule, all that is required is simply to plough 8 or 10 inches deep, and, as land is good and plentiful, dig holes about 18 inches to 24 deep, 32 feet apart, and in planting we fill in the holes and pack the surface-soil firmly, making a mound on top of which to place the tree, in the shape of an inverted basin; spread the roots well round, points looking downwards, the collar of the young tree to be 1 inch or 2 below the surface; then firmly pack the surface gently around the roots, pour in two or three buckets of water, which, of course, settles the soil well amongst the roots, thus never injuring the rootlets; fill up and stake the young trees in the spring, mulch well round with farm-yard manure. With that treatment our orchards do well. The aspect we consider best for orchards is a south-east one; north is objectionable on account of the hot winds which we occasionally have in the months of December and January. We prefer small trees with plenty of roots. In pruning we cut the tree back to three branches and leave two or three buds on each, thus giving the roots plenty of strength. We find that more growth is made by this plan than by leaving the tree as it comes from the nursery as many amateurs do. We can grow well peaches of all sorts, the Royal George and Newington Slipstones being best. The peach is a short liver, at least for the production of payable fruit, and by planting the first lot of trees 33 feet apart, we can then, at the end of ten or twelve years, plant again between the spaces, and the young ones are coming into bearing while the others are going off. Apricots also do well, especially Moor Park, Oullin's Early, and Royal Mansfield Seedling; they require the same treatment as the peach. Nectarines also do well, Roman and Hunt's Tawny being preferred. Pears also succeed, but in my case the trees grew to a great size and were about twelve years old before they commenced bearing, the favourites being Jargonelle, Williams' Bon Chrétien (Bartlett), Vicar of Wakefield, and Peach Pearl. Apples also do well, the best being Lemon Pippin, Lord Nelson, Prince of Pippins, and Morgan's Seedling. Figs also do remarkably well, but, as far as I know, we have not got the proper kinds for drying purposes.

We have been in the habit in previous years of getting a very good market in Melbourne for early peaches, apricots, and figs. As some of you may be aware, Victoria placed 1s. 6d. per bushel on all fruits, oranges excepted, which proceeding has curtailed the income from our orchards materially; however, we have the prospect of rail communication with Sydney shortly. We will then be able to deal with our own people, and you will then see by the fruits, &c., what can be done in our distant quarter. An agricultural college is badly wanted, as we mostly work in a haphazard manner, and cannot reasonably expect to realise from our land what we could with education accomplish. As to diseases, the peach and nectarine are subject to aphis and curl. For the former soft soap is principally used with a spray pump, but with that wash I have sometimes injured the tree without killing the aphis. Last year we were very much troubled with a small fly which sucked the ripe fruit; we have yet to learn an easy mode of getting rid of it. Of codlin moth we know nothing; I have never seen it in our district. What we want in our district is Government assistance in some way or other to establish canning and fruit-drying factories, for much of our fruit goes to waste or is used for pig feed. In conclusion, I may state, cherries

Digitized by Google

of all sorts do very well, but the market is very limited. Other points I should have liked to touch on, but suffice it for me to say that I think that Mr. Stieme's style of pruning could not be improved upon.

The effect of Railway Charges on the Fruit Industry.

T. A. JOHNSTON, Singleton.

WHEN railways were first spoken of in England all the wise men scoffed at the idea, and vowed it was impossible that passengers could ever be carried in cars driven by steam. When it was demonstrated in actual fact before their eyes, they all agreed that a speed of 8 miles an hour was the utmost limit of possibility, and even that would be accompanied by great danger. We, who are accustomed to see cars driven at a much greater speed cannot comprehend the objections of our ancestors to this great invention, and are inclined to think ourselves much wiser than they were. As we are invited here to discuss matters interesting to vine and fruit growers, I have a suggestion to make that is calculated to advance the interests not only of that small section of the community, but also those of the whole Colony. As most people at first receive it with doubts of its possibility, and when those doubts are removed, express the opinion that it will take a long time to accomplish, I ask you to bear in mind the reception accorded by the wise men of England to George Stephenson's railway scheme, and I ask you to believe that I do not introduce the subject without due deliberation, as indeed its grandeur demands. When therefore your attention is drawn to the fact that the greatest bar to enterprise, the greatest obstacle to progress, the most expensive item in the experience of every vigneron and fruit-grower, as well as of all other producers, is the enormous outlay incurred for freight on the railways, do not allow the apparent magnitude of the reform to impress you with the idea that it is either impossible or difficult, or even a slow process to remove that obstruction to national prosperity by abolishing all charges for freight or passage, and running our railways free.

Free railways will add enormously to the value of land; will rapidly multiply the population of the country districts, and so increase the net profits of agriculture, of mining, and of pastoral pursuits, that it will not be a matter of any difficulty to raise from the land a sum sufficient to cover the cost of the change. Suppose the present value of private lands to be £200,000,000, and again suppose that that value is only doubled by free railways, then we have added £200,000,000 to the value of private lands. A tax of 5 per cent. upon this added value alone would return as a revenue of £10,000,000 per annum, and no landowner could object to it, because it would secure the added value of £200,000,000 to the land. With a revenue of £10,000,000 from the land we could afford to run the railways free, and that would secure to the landowners the additional advantage of untaxed traffic. They would no longer be fined 10, 20, 50 per cent., or even more of the value of every ton of produce they sent to market, nor would they have to pay a similar fine on all their purchases; so that they will receive more and pay less than they now do.

Free railways will inaugurate an era of unexampled progress and prosperity, and would bring with them a list of blessings and benefits impossible to enumerate. To attempt to do so or to trouble you with details is quite unnecessary. You have the scheme in outline, and can fill it up at your leisure, but I hope that you will all conclude that free railways will do more to advance our interests than can be done in any other way.

Digitized by Google

Orchard Cultivation in England and France.

JOHN PLUMMER, Sydney.

HAVING enjoyed numerous opportunities of becoming acquainted with the routine of orchard cultivation in the English midland districts, and of visiting the cherry orchards in Kent and the apple orchards in Normandy, perhaps a few remarks concerning the same may not be without interest to those fruit-growers who may not have had the same facilities.

It should be premised that in one respect orchard cultivation in England and France differs from that in Australia. In the two first-mentioned countries the greater number of orchards have been in existence many years, several having been formed from three to five centuries ago, and consequently in these all the peculiarities of soil and climate are thoroughly understood, the orchardists knowing exactly what and what not to do. In Australia it is the reverse. Here many of the orchards claim an existence of only a few years, and despite the rapidly-increasing magnitude of the fruit-growing industry, it still partakes largely of an experimental character, the conditions of climate being so different to what are found existing in northern Europe.

In the English midland counties the more successful orchards, those producing the largest and finest apples and pears, are generally situated on gently sloping ground, having a southerly aspect, a southern exposure being found to give increased richness of flavour to the fruit. Where the fruit-trees are liable to be violently shaken by the autumn storm-winds, shelter trees are planted in places where they are likely to aid in breaking the force of the wind.

The soils are of various kinds, always excepting heavy clay, the best being a rich sandy loam, which is neither too dry nor too moist. If the former, the trees are apt to canker and the extremities of their shoots to dry back; while, if the latter, they become diseased and overgrown with moss. From long experience the orchardists readily perceive when either extreme exists, and adopt remedial measures accordingly. But the rainfall in England is so abundant that the danger to be guarded against is rather excess of moisture, while in Australia, as a rule, it is excess of dryness.

All the best orchards are regularly manured, excepting when the soil is exceptionally rich, and weeds are kept down as much as possible. Vegetables are sometimes grown in the spaces between the trees, but generally, in the best orchards, there exists a disinclination to aid in impoverishing the soil. Stable manure is preferred, artificial manures being seldom used, not from any distrust of their efficacy but because stable manure is cheap and abundant. All house and garden refuse is buried, nothing being left to waste. Even the stagnant ditches, which often form portion of the orchard boundaries, are utilised, their contents being employed as fertilisers when necessary.

In most orchards there is generally a number of young trees and stocks for grafting, which are planted at the proper season in convenient places, so that in nearly every orchard may be seen fruit-trees in all stages of growth, the succession being maintained through many years. When a young tree is to be planted the ground is prepared some time beforehand by being heavily trenched and mixed with well-rotted dung. Afterwards a hole is dug sufficiently large to enable the roots of the tree to be extended at full length, after which the hole is filled up, but the earth must not be pressed down too heavily. The trees are planted, so that when full grown they will not

Digitized by Google

be too close to each other, it being essential that each should obtain as much of light and air as possible.

Of the various details of cultivation, pruning, &c., there is little or nothing with which Australian orchardists are not practically familiar; and the same may be said of the countless varieties of apple and pear grown in England; but it should be mentioned that the work of the orchard and the kinds of fruit cultivated are largely influenced by local circumstances. Thus, in one orchard, the ribston pippin will be found thriving and abundant, while in another orchard, in the same neighbourhood, and apparently under the same conditions, it is a failure. Sometimes, however, the diverse results are found to arise from systematic, as compared with non-systematic, cultivation, the successful orchardist giving his fruit-trees as much care and attention as if they were choice plants in a flower garden.

Among the insect pests which infest the English apple-trees is one well known in Australia, namely, the codlin moth; but its ravages are kept down by the watchful care of the orchardist, who systematically destroys the fallen apples and keeps the stems of the trees free from loose bark. In fact the English orchardist exercises unceasing vigilance as regards keeping his trees freed from insect pests.

Pears are not so extensively grown as are apples, the latter being the most marketable fruit by reason of their keeping qualities; but where cultivated, the choicer qualities, such as the Bergamot, are preferred. The conditions of cultivation are, generally speaking, much the same as in the case of the apple, but the pear is more liable to canker and to attacks by various kinds of worm and caterpillar.

In Normandy the system of subdividing the land among the family of an owner in the event of his decease has had the double effect of restricting the number of large orchards and increasing that of small ones; but in almost every part of the country the apple thrives with comparatively little trouble. This part of France has for centuries been famous as an apple-growing district, and it was from here that the ribston pippin and other choice varieties were originally introduced into England. The climate of Normandy is not unlike that of the Goulburn district in the south of the Colony, and of the New England district in the north, except that the winter season is of longer duration, and frequently of greater severity.

In the Norman orchards every foot of soil is annually turned over with the spade, and every scrap of manure and other refuse carefully utilised, the Norman fruit-grower being as patient, persevering, and industrious in his work as is the Chinese market gardener. A considerable portion of the fruit is purchased by agents, either in the local markets or direct from the orchardists, and sent either to Paris or to London, according to the state of the demand in either city.

Only the sound dry fruit is sent away, the other kinds being taken to the cider presses, as in Devonshire, where is produced the finest cider known in England. Normandy apples, especially the pippins, command a good sale in the English market, and are preferred to American apples by the dealers, in consequence of their retaining their flavour a longer period.

The cultivation of the apple is steadily on the increase in France, in consequence of the rapid development of the cider manufacture, by reason of the frequent failures of the wine crop. The new trees are mostly planted in pasture grounds, the best soil being that which is high and fertile, and not exposed to the sea breezes. The trees begin to bear at ten years, the average annual product of each being about 400 lb. of fruit. Apples for cider are now grown in about two-thirds of the French departments.

Digitized by Google

The Kentish cherry orchards have soils of a somewhat free and sandy loam, which enables the roots to travel a considerable distance in search of moisture, which is indispensable to the welfare of the trees. Some of these orchards have been in existence from four to five hundred years, the older trees, as they became unfruitful, being replaced by younger ones of the same or analogous kinds. In planting the latter, care is taken that the earth is not freshly manured, but with this exception the process is the same as that for planting apple and pear trees.

The most fruitful orchards have a southern exposure, and are protected by shelter trees from the effects of heavy winds. Care is also taken that the soil be not too rich; where such is the case, as shown by the exudation of gum or sap from a rent in the bark, the tree is taken up and replanted in poorer ground.

The cherry orchards bring a good profit when properly cultivated, the demand generally being in excess of the supply, which is augmented by importations from Jersey and part of Normandy. The black cherries are grown most abundantly, and are largely used for preserving purposes, but do not export well when ripe. The yellow kinds are favourites for dessert, the choicer and larger varieties commanding good prices. The Kentish or red cherries also sell well, principally for making puddings and pies.

Many of the cherries brought to the Sydney market are small and flavourless. They are all of the yellow kind. Fruit of a similar description is sometimes seen, but not often in England, where it is described as being a result of deficient moisture and insufficient space for the roots to become extended. I have seen cherries grown in the New England district fully equal to the best in the English market, but it appeared that the cost of sending the fruit to Sydney was too great to enable cherry cultivation to be profitably conducted on a large scale, despite the reductions made from time to time by the Railway Department.

An experienced English fruit-grower, who was in Sydney some two or three years ago, expressed to me his conviction that New South Wales was naturally a magnificent fruit-growing country, but that the differences of soil and climate, as contrasted with those of Europe and America, would have to be carefully studied if the progress of the fruit-growing industry was not to be attended by occasional disappointment and failure.

Bees as Fertilisers and Fruit Producers.

W. T. SEABROOK, Gordon.

If we take our stand before a flourishing hive of bees on a fine day in spring we shall note crowds of busy workers settling on the alighting board as they return from their numerous excursions in the orchards, heavily laden with pellets of pollen of various colours upon their hind legs. Could we follow them as they enter the hive, we should find in almost every instance that this visible load is not all they carry but that having freed themselves of this they proceed to empty, from a false stomach, the nectar gathered also from the blooms, and which, when thickened by evaporation, we call honey. Questions may now be asked, "Why do bees gather these two substances, and why do the blooms furnish them?" The answer to the first every bee-keeper would readily give: These form the food of the whole community, although pollen is principally needed by the growing larvæ. As an answer to the latter, I would say that the nectar in blossoms is produced as an attraction to bees, who whilst collecting the same transfer the pollen grains from one bloom to

Digitized by Google

another thereby rendering effectual cross-fertilisation. I will now take the orchard: Fruit-growers are almost entirely dependent on bees to fertilise the blossoms so as to "set" the fruit, without the assistance of which their trees would be far less productive; for instance, we will take the strawberry, raspberry, apple, pear, &c., their stigmas come to maturity long before their anthers, hence bees are very necessary to convey the pollen from the old to the young bloom. In gooseberries the anthers are ripe long before the stigmas, so that self-fertilisation is impossible, and unless there are bees to transfer the pollen from the young to the old bloom, the ovary always withers and drops off along with the flower. I remember a few years ago visiting a large orchard in England, and whilst the proprietor was showing me round, I observed several skeps of bees (the old English style of bee-hive) planted in different parts of his orchard, and when asked the question, "Why do you keep so many bees?" he replied with a smile, "Why I tried doing without them some time since, and their absence did not answer; my crops of fruit were hardly worth gathering." I have met several fruit-growers in this Colony and England with very peculiar ideas in regard to the valuable services rendered by bees as fertilisers. Some look upon them as being detrimental to their crops, because they destroy their fruit by perforating the skin, more especially the grape, from which they suck the sweet juices. This is a very unjust charge to make against our diligent little workers for they are not provided with the necessary means for performing such a delicate operation, they acting simply as agents only to birds, after the fruit has been injured by them or insects, or cracked by the weather or by falling to the ground. I took particular notice last autumn (when honey was scarce) of a neighbour's orchard where many bees were busy at work among some pears that had fallen to the ground, half eaten by birds and flying-foxes, partially decayed, and with as many as six bees in one cavity at a time. It is at these periods bees constitute themselves scavengers by licking up anything that contains saccharine matter in any form (such fruit as over-ripe pears yield much sugary matter, some being nearly all as it were soluble) which they unhesitatingly take home and store up as if it were honey. It is satisfactory to note that every year brings us clearer evidence that the two sciences of agriculture and apiculture are coming into closer approximation, and are becoming more mutually helpful to each other, and now that large tracts of land in this Colony are annually being utilised for the cultivation of fruit, in which bees play a most important part in the fertilisation of blossoms, it will be found that the keeping of bees is a useful auxiliary to all fruit-farmers, and this not only for the purpose of fertilising the flowers and the production of fruit, but also for the ingathering of honey, which will be found no slight incentive to the farmer to include bee-keeping as a branch of horticulture and agriculture. We will presume the fruit-grower keeps (say) fifty stocks of Italian bees (in hives similar to those we use), and is located in a favourable district, and gives them the necessary attention; he should receive from them, taking an average of good and bad seasons, at least 112 lb. extracted honey per hive; total for fifty hives (say) 5,600 lb. at 4½d.=£105. What a grand addition this would be to his income. A bee-farmer in Queensland, possessing ninety stocks of bees, informed us some time since he extracted 11 tons of honey from which he realized nearly £700. This alone shows bee-farming is very remunerative, and although the latter case is an exceptionally good return the former will stand the test of averaged practice. Instances need not be multiplied to show the profitable nature of the occupation which we wish to urge upon the attention of all those whose interests rest upon the products of the land.

Digitized by Google

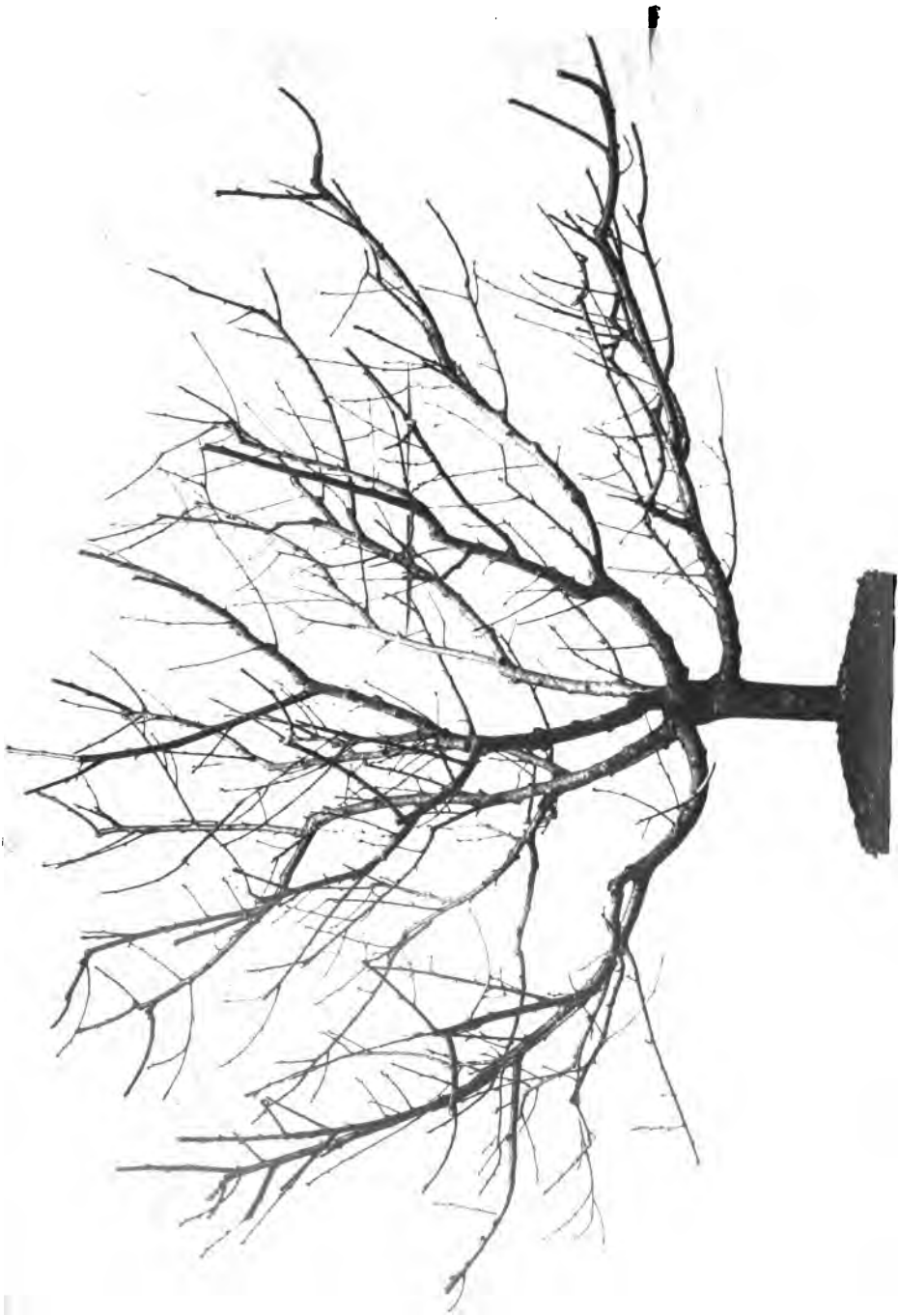
Digitized by Google

Heliotype.

Bad Pruning—Lord Palmerston Peach, 2 years old.

Digitized by Google

Digitized by Google



Digitized by Google

Mr. STIEME, Fairfield, showed the delegates a variety of specimens of oranges, and briefly explained their peculiarities of growth. He also illustrated, in a practical fashion, his method of pruning peach and other fruit-trees. He said that, in pruning this class of fruit-trees, it was a mistake to cut away the branches so as to expose the centre of the tree, as adopted by growers in the old country, where it was necessary to get all the sunshine possible on the tree. Here, in Australia, we had too much sun, and it should be the object of growers to protect the tree as much as possible. Much fruit was destroyed each season by the sun, and, therefore, the tree centre should be protected. This was best done by the pruning which should always be begun at the top, as he had just illustrated. The branches should be kept as compact as possible.

Figure 1 represents a Lord Palmerston peach, four years old, well pruned.

Figure 2 represents a two-years-old tree, the pruning of which is defective in character. The lower portion is altogether too open, and too much wood has been taken away; as already stated, this leaves the stem too much exposed to the action of the sun, which has the same injurious effect on the leaving branches. The upper portion is fairly pruned.

A discussion was opened upon the papers which had been read.

Mr. W. H. ORAM, Crookwell, said he was pleased at the meeting of the Conference. For a number of years he had advocated the establishment of a Department of Agriculture, believing that much good to the country would result therefrom. He had obtained his education in an agricultural school; he was a practical agriculturist and horticulturist, and could therefore speak with authority on the subject of fruit culture. The papers which they had heard read, if they did nothing else, would set the people thinking. Mr. Gelding had remarked that the Department of Agriculture should establish test farms or gardens in different parts of Colony. He quite agreed with Mr. Gelding in that. He took it to be the duty of the Government in a new country to encourage settlement, and it was a well-known fact that the liberal land laws of New South Wales had been the means of inducing numbers of persons to settle on the soil who had no knowledge either of agriculture or horticulture; and, as a permanent settlement was essential to the prosperity of the country, it should be the duty of the department to establish test farms in which those who desired to become settlers could gain practical experience. The Colony was capable of producing nearly every conceivable variety of fruit. In the Crookwell district apples and small fruits grew to perfection, but he considered that these farms should be formed on a small scale, and in every agricultural district. In the District of Corowa a farm would be of great value. Situated as they were, several thousand feet above the sea, they could only grow certain crops and fruits, particularly the apple and small fruits. These could be grown there to perfection, but for want of railway communication tons of fruit rotted upon the ground. They had to pay carriage over the 30 miles, from Crookwell to Goulburn, and then carriage from Goulburn to Sydney, and, notwithstanding what Mr. Johnson had said, if the growers in his district had proper communication they would willingly pay the freight. The season before last apples were so plentiful that it was impossible to give them away. Plums and cherries also flourished, but they were not cultivated, because there was no market for them. Mr. Gelding made a very practical observation when he said that it should be possible to cross-fertilise blight-proof apples. The way to accomplish this, he thought, would be to use netting or veils and to prevent inoculation by bees. He had seen it done in the old country,

Digitized by Google

he did not see why we could not cross-fertilise certain varieties here which were known to be blight-proof. It could be done if growers would only have patience and take pains. The Government might well step in and assist them. This was a subject which the new department should deal with, by experimenting on varieties of apples which orchardists could grow without danger from the American blight. With regard to orchard planting, he believed that the present was the best time for forming new orchards. He recommended that where a farmer could not afford the expense of subsoiling by hand labour he should resort to ploughing and harrowing. That was found to succeed in his district where they had a deep chocolate soil. The orchards there flourished when the ground had only been ploughed to a depth of some 7 inches. In ploughing for orchards, if the orchardist could not afford the expense of a subsoil plough, he recommended that a single furrowed plough should be used. Each furrow should be followed up two or three times, and the soil could thus become well broken to a depth of 14 inches. When trees were planted in land ploughed shallow it was impossible for them to succeed. Work the land well, plough to a depth of about 14 inches, and you will have a fine healthy tree, whereas, by merely stirring the surface, the trees had not the slightest chance. He quite endorsed Mr. Stieme's remarks in regard to drainage, and it was his own conviction that, unless care was taken in this all-important matter, no orchardist would ever derive much. He trusted that, as a result of the deliberations of the Conference, many people would be induced to plant orchards, and that farms and gardens would be established in the centres of agricultural settlements throughout the Colony.

Mr. R. Pulver, Wagga, endorsed what had been said by Mr. Stieme, as to the necessity for protecting fruit-trees from the sun. It was his experience that the sun spoiled a large amount of fruit. He generally covered not only cherry but all young trees, and encouraged the shoots to grow all round the stem. He practised the system of close pruning advocated by Mr. Stieme, and found it most successful.

Mr. J. D. Lankester, Albury, said that he agreed with the remarks of Mr. Stieme as to the necessity for trenching and draining the ground for orchards and vineyards. In the Albury district he had noticed that those vineyards which were properly trenched to a depth of 20 inches succeeded best. The cultivation afterwards was an easy matter; when the surface of the ground had been broken and trenched weeds could not maintain a footing very easily. He quite agreed with what Mr. Stieme had said in regard to trenching and drainage; without these we can do nothing in either a vineyard or orchard.

Mr. Hayes, Singleton, commented upon the statement made by Mr. Rogers as to mulching with forest leaves. He thoroughly believed in the efficacy of forest leaves for mulching. It had been his custom to cover the soil for some distance round his orange-trees with a mulching formed of eucalyptus leaves, and he found at the end of a dry summer that the soil was perfectly moist, and the trees had been greatly benefited. He did not know whether there was any special virtue in the eucalyptus leaves, but he had observed that while surrounding orangeries had been attacked by red scale his trees were unaffected by the disease. He produced specimens of fruit grown this year from trees 10 years old, bearing no sign of red scale. His trees had never yet been attacked, although trees more recently planted were covered by scale. Eucalyptus leaves were valuable, he knew, for manure, and he would like to know if any member of the Conference could tell him whether the leaves had anything to do with preventing these attacks.

Digitized by Google

The CHAIRMAN said that in connection with the inquiry made by Mr. Hayes, it has been mentioned to him that the late Mr. Pye had successfully used a decotion of eucalyptus leaves for syringing his fruit-trees. A son of Mr. Pye was present at the conference and perhaps that gentleman could give them some information thereon.

Mr. THOS. PYE, Seven Hills, said he was not sure of the exact constituents which his father used for the decoction. He believed it contained, not eucalyptus leaves alone, but sulphur, and several other ingredients.

Mr. R. SCOBIE, M.L.A., West Maitland, said that peaches and nectarines were not nearly so good at the present time as they were some years ago. This in a measure might be due to the different diseases which were now known to affect these trees. For instance, we had a peach blight which was highly destructive to them. There was also a disease which caused the leaves of the trees to drop off, and which seemed to retard their fertility. He had seen the Royal George peach bear freely for several years in succession, retarded by the blight, and after a while make a fresh start, and bear abundantly. As to aphides, he had seen them attack and destroy trees in a similar way. A variety of new diseases had appeared within the last few years, but whether they had come to stay he did not know. Stress had been laid upon using unsuitable land for orchard purposes. Unsuitable land had its own drawbacks. If it was poverty-stricken it was impossible to get much from it; but if poor land was put forward as a reason for disease, he thought they might possibly be wrong in their conjecture. It had been generally found that the trees attacked were those suitable for the food of insects, and naturally they fastened upon the strongest and most vigorous. It did not follow that, because a tree was attacked by disease, it was not healthy. As to trenching, he remarked that there was a good deal of land that did not require it. On alluvial flats, where there was 20 or 30 feet of soil without impediment, trenching was not needed. Some people were under the impression that hilly slopes did not require drainage, and consequently they had not resorted to it. That was a mistake. Where the slopes had clay sub-soil, they required more draining than any other kind of land, because water, not being able to penetrate the clay, forced its way through the loose soil, to the foot of the hill. If drains were made, the water would be uniformly carried away, and the surface of the land be thus undisturbed. Mr. Gelding had objected to the use of shears. He had been a grape-pruner for many years and had always considered them to be a great advantage. He certainly would not now adopt the pruning-knife instead of the shears. No doubt it was a mistake to use defective shears,—better get a new pair at once. The secret of pruning lay, not in the hand that used the shears but in the hand which manipulated the wood. The cut should be made towards the eye, and the shears kept sharp. One speaker had referred to treating vines with sulphur. His experience had been, that when the season was cold and moist this treatment did not completely eradicate the blight; but in dry seasons, when the hot winds prevailed, it was deadly to the oïdium. He could quite imagine that in cold climates sulphur would not be so efficacious as in warmer ones; and it would be probably worth their while to look round and find out some remedy which would act efficiently in cool districts. Mr. Rogers had spoken of the fruit imported into this country as a large item. A good deal of it could not possibly be shut out. It came here just at the seasons when our own crops had been exhausted. The American apples surely did not interfere with our home-grown fruit. The American apple was flavourless and far inferior to the home-grown fruit. No doubt the importation of this variety could be prevented, but there were many fruits, such as pine-apples

Digitized by Google

and bananas and other varieties, as yet little cultivated in New South Wales, which we could not afford to keep out. This might suggest the propriety of conducting experiments for finding out how to save our own apples, pears, and fruit of a similar kind for a longer period than we hitherto have been able to do. By this means we might be in a position to dispense with much of the fruit now imported. With regard to the theory that the more highly land was cultivated the better it was, he thought that some explanation was required. In a dry season, no doubt, the more the land was worked the less it acted as a non-conductor of heat. Moisture was always found in well-cultivated land; not when its surface was baked and hardened by the sun. In a wet season, such as we have just passed through, the more the land was worked the more sticky and ill-conditioned it became. Thus it would be seen that some judgment was required in cultivating the soil. Mr. Plummer, in his paper, had made reference to gumming, attributing it to over richness of the soil. He recollected in his early days a red plum-tree which was continually gumming and bore no fruit. He obtained another variety which was free from this tendency, and planted it in richer soil, and found it did not gum. He then came to the conclusion that freedom from gumming depended more upon the variety of the tree than upon the soil in which it was planted.

The CHAIRMAN said it might be interesting to the delegates to know that he had received from the Government Printer the proofs of several valuable papers dealing with fruit culture which had been prepared for publication in an early number of the *Gazette*. The first treated of the codlin moth. Although some of them knew much of this pest they did not know how to eradicate it from their orchards. This paper would contain a *résumé* of all that was known about the moth, and fruit-growers might safely rely upon the information. Illustration plates had been prepared depicting the codlin moth, another moth less known, and, what was more important, the enemies of the codlin moth, which were known to exist in this country and in America.

Mr. WM. CLEGHORN, Uralla, referring to the stress which had been laid upon the subject of trenching, said that while this system was no doubt theoretically correct, yet, if the planting of orchards in this country had depended upon its use, little would have been done, because of the great cost. In the New England District it was found quite sufficient to plough the soil to a depth of about 12 inches. He made it a rule, however, wherever the water showed a tendency to lodge after heavy rains, to drain to a depth of 2 feet 6 inches, and then to fill the trench with small stones to a depth of 18 inches. This had the effect of aerating the land and generally increasing its fertility. In cultivation he endeavoured not to disturb the trees after their arrival at maturity. The difficulty with plum-trees in his district was that they bore too freely. The new Department of Agriculture would undoubtedly prove a great boon to orchardists. Something had been said about persons planting in unsuitable localities, and then being obliged to abandon their land; but they must not lose sight of what the people had done unassisted. In future the department would itself conduct experiments of the different soils and climates, with a view of ascertaining which were most suitable to each variety of produce. No doubt blunders had been made, but the people were in earnest, and carried on their work under very adverse conditions. The Government had now inaugurated a Department of Agriculture which would have at its command the best experience obtainable, and individuals would be relieved of the experimental work which they had in the past found it necessary to do for themselves.

Digitized by Google

Mr. E. WHITAKER, Parramatta, said that Mr. Stieme had mentioned the yellow Italian peach in his paper. There were two kinds of this tree. Sir William M'Arthur first imported the seed from which this variety was raised, and in the garden at Camden the different trees could be seen growing side by side. One was an abundant bearer, the other was a shy bearer; and whoever obtained scions from the latter would have shy bearers also. The peach had been spoken of both as a long-lived and as a short-lived tree. He knew that a seedling peach would not live nearly so long as a seedling apricot or an apricot grafted upon a peach. He also knew of an apricot which had been grafted upon a June peach sixty years ago. The tree was still alive and bearing, while peaches which stood alongside died thirty years ago. There must be something in this grafting of the apricot upon the peach which prolongs the life of the stock, and some of the orchardists of Parramatta were trying to discover what it was.

Mr. FRAUENFELDER, Albury, said that uncertainty of bearing was noticeable in certain varieties of grapes. The Muscat of Alexandria and the black Hamburgh grapes were uncertain bearers, and he attributed this to the sexes of the blossoms. So long as they could not control sex development in embryo so long would they be unable to control the fertility of the vine.

Mr. STIEME was of opinion that a mulching with new green eucalyptus leaves would poison the ground for three years. The leaves, if used in a dry state, however, were a good manure and stimulant. He did not believe, as Mr. Hayes seemed to think, that a mulching of eucalyptus leaves would prevent scale. The disease was apt to be more prevalent in wet than in dry seasons—why, he could not say. Over-bearing trees appeared to be specially subject to this disease.

Mr. HAYES explained that his plan was to cut down the forest leaves, and to bring them in green and pack them round the trees. The result he had proved to the Conference by the clean fruit exhibited.

Mr. PURSER, Seven Hills, afforded an interesting description of the methods of fruit cultivation which he pursued in his orchard at Seven Hills. The soil had a shaly or sandstone bottom, and with careful working and draining his fruit-trees grew remarkably well in it. Many of the trees were planted by his father. Some of them were as much as 76 feet in circumference, and 24 feet high, and they were in full bearing. He had chiefly raised his trees from seed or from scions of those he already had. This system he found very much better than purchasing from nurserymen. He believed in grafting the orange upon the lemon, for it produced the best fruit and most abundantly. As a rule he planted from 20 to 22 feet apart, and never allowed the rows to extend beyond ten or fifteen trees, without making a wide road. His system of pruning was very much like that illustrated by Mr. Stieme.

Mr. J. GELDING, Sydney, said he was much pleased to hear Mr. Purser's remarks, towards the end of which he had informed them that his subsoil consisted of shale and freestone. If all orange-growers could obtain a subsoil of that description they would be able to grow oranges as well as Mr. Purser. He knew an old orchard at Parramatta, with a similar underlay, and some of the trees were eighty years old. The conclusion he came to, after seeing it, was that the fertility of the trees was entirely owing to their situation. In the paper he had read to the Conference he did not, as some delegates seemed to think, advocate deep trenching everywhere; to advise this would be to advise them wrongly. At Tenterfield, for instance, where they had a magnificent soil, trenching was not so necessary as on land nearer Sydney. If it was impossible to get good soil and a good situation they must

Digitized by Google

resort to other means for the improvement of orange culture. With all respect to Mr. Purser it was his opinion that no matter upon what tree the orange was grafted, if planted in an unsuitable situation, as many orchards were, they would certainly find the scale appear in spite of all efforts at prevention. As regarded mulching, no doubt great good had resulted from it. He had always been a believer in it. It was essential, not only in cultivating trees, but for flowers also, the more they could mulch the better it would be for each. It prevented evaporation taking place too rapidly in the summer season, it kept the roots cool, and it formed a manure as it decomposed. He knew an orchardist at Springwood who depended almost entirely upon mulching for the cultivation of his orange-trees. Returning to the question of trenching, he remarked that for many growers hand-trenching was too expensive, but some had advocated too deep a system of trenching. If he were preparing an orchard he would not think of trenching deeper than 18 inches; to go deeper would do more harm than good. Much time would be saved if growers were to combine and use special trenching ploughs which would enable them to do the work at a cheap rate. Apart from this, he maintained that even if the cost were £30 per acre, for properly trenching bad ground, growers would be amply compensated for the outlay by the good results accruing. This fact should be impressed upon those who were laying out new orchards and it was a fact which the new Agricultural Department might very well impress upon them. It was of no use being guided by solitary examples. They must take the general run. If they continually urged upon growers the necessity of acting on approved general principles they would be helping to place fruit-growing in a higher position than it now occupied. In a new country they must strike out a fresh path for themselves, if they wished to succeed.

The Director said he had seen the orchard at Springwood, referred to by Mr. Gelding, on many occasions. It was, he believed, fifteen years old, and it consisted of 20 acres. It was mulched every year with soil and decayed forest leaves and ferns. He had never seen green leaves used, nor did he advocate the use of them. The mulching was heaped round the trees to a depth of 18 inches and it was gradually forming an excellent soil. No other manure of any sort had ever been used on this orchard, and it bears excellent crops of clean, healthy fruit.

Mr. C. B. Cairnes, Parramatta, asked if it was Mr. Ellison's orchard that was referred to. If so, he believed the mulching used was the common bracken. This fern, in a decaying state, appeared to contain properties—whether potash or not, he was uncertain—which made it highly suitable for mulching purposes.

Mr. Hutchison, M.L.A., said that one of the previous speakers had laid down a principle by which they would have to be governed. The object of the Agricultural Department would be to obtain information upon the varying conditions of the Colony for the benefit of those engaged in agricultural and kindred pursuits. As they all knew well, there were many climates and many soils, and it was highly desirable that the department should obtain all the information it could concerning them. Most of the soil in Central Cumberland was a sandy loam with, at no great depth, a yellow clay, and no sooner did the orange-tree roots reach the clay than they died. If the department was to be a real benefit it would be necessary for it to instruct people in the different districts on the question as to which trees were most suitable for those localities. Many fruit-growers were ignorant of these facts, but they had shown wonderful spirit and they had struggled bravely against odds. A change was coming over these men, and the new depart-

Digitized by Google

ment could therefore guide them aright. It was necessary, first of all, to teach the men in Central Cumberland to drain; hitherto they had not thought it necessary to do so. As for getting trees in Central Cumberland to live and bear simply by mulching, that was impossible. Some gentlemen seemed to imagine that a special virtue attached to mulching; if so it was the duty of the department to ascertain this. He thought the majority of growers were in need of instruction in pruning; in fact many of them instead of benefiting the tree merely cut away all the wood that was likely to bear fruit. An officer should be appointed to go round and give practical instruction in pruning, theoretical teaching was not of the slightest use, and a grower could, by seeing the work done practically, learn everything that was essential in about 5 minutes.

Mr. E. P. Barnes, Cootamundra, expressed the pleasure he felt that the Department of Agriculture was now established. He had advocated its formation for some years, and was glad to be sent by his association as a delegate to the first Conference. He agreed with Mr. Hutchison, that this department would have to educate the people. Many had started as fruit-growers, with little or no knowledge of the capabilities of the soil, and the department would have a good work before it in teaching these men, through the medium of model farms, what those capabilities were. Officers should be appointed to go through the country and instruct those who wish to lay out orchards as to the best methods of planting. Upon the question of trenching, he thought it would be a mistake to trench too deeply where there was a sub-soil of clay; plough trenching to a depth of 18 inches was far preferable. The department might also assist growers by giving them hints as to the best methods of pruning. In the district he represented, plough trenching was found to answer remarkably well. The soil was deep chocolate, interspersed with a quartz gravel, which was the best mulching they could possibly have in the summer time.

Mr. Frank Farnell, M.L.A., said he believed the outcome of the Conference would be one of great benefit to the people of the country. The information that the delegates, who came from all parts of the Colony, could afford, would be of the highest value in the future. The Minister was to be congratulated upon the step which he had taken. It was one which would meet with the approval of the people, and which would receive the unanimous support of Parliament. In the past it must be admitted the fruit-growing industry had been neglected. The different unions and associations had helped the vine and fruit growers very considerably, but the information which they possessed, and which was of great value, had not been properly disseminated. He was convinced that the future of this branch of cultivation would be a very bright one, and the value of the Conference, which was essentially practical in its aims, could not be over estimated.

Mr. Grunsell, Goulburn, urged that in the planting of orchards, no matter what the ground or class of tree might be, unless the grower persevered in his work he could not expect the best of results. It was only by constant labour and attention that the quality of the fruit could be improved, and it was a wrong policy, because an orchard did not pay, to abandon it. He said this to encourage those who were commencing as orchardists.

Mr. C. A. Lee, M.L.A., said it was both interesting and useful to learn how the different kinds of cultivation had worked in different parts of the Colony. That was really one of the objects they had met to ascertain, and in the future their experience would teach practical men that what would do for one part of the country would not do for another. Although they might live in the same temperature, at the same altitude, and have the same rainfall,

Digitized by Google

there were other divergences which modified the suitability of any special treatment. It was only by a system of comparison that they could ever hope to find out the varying conditions under which they lived. Many speakers had confined their attention, and rightly so, to the productions of the county of Cumberland. They all admitted that that part of the Colony was a wealthy one, in the growth of fruits, both for consumption and for exportation. Yet no portion of New South Wales contained more poor soil.

Mr. HUTCHISON: That shows the enterprise of the people.

Mr. LEE (continuing): The growers had positively done wonders. They had produced fruit under disadvantages which in any other part of the country would have crushed the cultivators out of existence. Owing to the proximity of the great markets men had been persuaded to devote their energies, time, and money to this class of cultivation, and they had been highly successful. If this could be done under such adverse conditions what should they not do in districts where the conditions were highly favourable. We had both the right kind of soil and the most suitable climates, but what was wanted was the knowledge to utilise them. He was typical of many more who practised fruit-growing. He had selected an excellent piece of ground and had planted the best varieties of trees. He kept it clean, took every precaution, and after three or four years of waiting he found that while some trees were doing well others were doing but indifferently. He found apples throve well; pears but poorly. Now he wanted to find out the cause of that and he took it that it was one of the objects of the department to tell him. Different soils he had discovered, required different manures, as did also different trees; and here again the department could educate them by telling them what was deficient in the soil and what was required to be restored. No doubt the department would be only too willing to give them this information, and like reasonable men they should seek it, and save themselves and the country from perpetually blundering. He would give them an illustration of what he meant: A gentleman, with whom he was acquainted, took up some rich country in the north. Sugar was growing in all directions. He cleared his block of land, and planted sugar, and at the end of two years, to his astonishment, instead of having a splendid crushing, he found the cane contained no juice at all. Then he did as he ought to have done in the first instance. He had the soil analysed by a chemist, and was informed that it was not at all suitable for sugar-growing. That was a serious loss to the grower, and also a loss to the country. This illustration would serve to show the great need there was to have a department which could do experimental work of this kind. So much for the cultivation of fruit. Next they had to consider, having grown the fruit, what were they to do with it. That was a very pertinent question, and for this reason: how was it that while we were growing such enormous quantities of fruit we could not retain sufficient for our own use? All the fruit produced here was disposed of within a very short time, and when we most wanted it and it was most expensive we had to get supplies from the other colonies. Surely apples would grow here quite as well as in Tasmania, and that being so surely we could preserve them. There was no special secret in the method of preserving green fruit. It was simply a question of picking the fruit at the proper time and of storing it carefully. It was a reflection upon the fruit-growers of New South Wales that we required to import fruit when we could grow it so abundantly. A friend of his, who was present at the Conference as a delegate from Tenterfield, and who was an orchardist of note, had been experimenting upon apples, and he had succeeded in rendering all kinds

Digitized by Google

blight-proof. He quoted this gentleman's case, in order to answer an argument which had been raised as to the carriage of fruit. The gentleman he had referred to, resided 240 miles from Brisbane, and during last year he sent between 700 and 800 cases to the Brisbane market, at remunerative prices. Growers in Armidale, which was 367 miles from Brisbane, did the same thing. Now, Armidale was as near to Sydney as it was to the Queensland capital, and he presumed the latter must be the best market, or the growers would not consign their fruit there. If it would pay to send fruit to Brisbane it would pay to send it to Sydney. What was required was, that they should study the best means of saving the fruit. Too much attention could not be bestowed upon that subject. Many experiments had been made of late, and with varying success, and the subject might well now be taken up by the department. This applied particularly to fruits such as the orange, lemon, and apple, which would bear carriage; but in the warmer parts of the Colony enormous quantities of store fruit—peaches, nectarines, and apricots grew, which would require preservation. He was under the impression that the county of Cumberland produced more than sufficient of this class of fruit to keep half a dozen canning works going. He had been told, however, that the large factory at Rooty Hill had had to stop because of its inability to obtain enough fruit. If that was correct, how did it come about that there was a complaint at not being able to find a market near at hand? Stone fruit, grown inland, could never compete with that grown nearer Sydney. If the quantity grown was not sufficient did it not seem that a large area of country might still be utilised for stone fruit, in order to supply the canning factories. There were some fruits which would not keep, and they must be rushed into the market at once. There was another class which could be grown in large quantities and sold at remunerative prices, but sufficient consideration was not given to these special varieties. Now, as to diseases: The codlin moth was a great enemy to the apple-grower. If a tree was to bear well it must be free from disease, and it behoved them to do their utmost to eradicate this and similar pests. To conclude, he thought it was the duty of every man who followed fruit-growing to ascertain the most suitable climate, and the best soil for the trees he wished to cultivate. If the department could supply this information he believed it could be done through the medium of the experimental farms which it was proposed to establish in different districts—the people ought to avail themselves of it; and if they did, he felt sure that before long we should see a wonderful improvement in the industry.

Mr. Stieme, Fairfield, informed the Conference that the cause of the stoppage of the Rooty Hill canning works was the failure of the fruit crop this year, due to heavy rains washing the pollen out of the blossoms.

The Director said, that with reference to the analysis of soils, it was only fair to mention that the Minister, before the Department had been in existence a month, appointed a consulting chemist, who would analyse samples of soils forwarded by *bona fide* growers, free of charge. Directly a desire for such information was evinced, other chemists would doubtless be appointed. At the present moment he might state he had at least sixty samples of soils waiting to be analysed. A gentleman came to him recently with a sample of soil in which he said he proposed to grow oranges. To all appearance the soil was excellent, but upon analysis it was found to be absolutely deficient in lime, and as this chemical was essential it would have been impossible to cultivate that fruit in the soil as it then was. The gentleman was advised of the fact, and consequently he was saved some hundreds of pounds. Another gentleman brought some soil, in which he

Digitized by Google

said he could not grow vegetables, and asked the reason. Upon examination it was found to be deficient in potash, and he was informed of the manure which was necessary to restore its fruitfulness. These examples would show the value of analysis as a guide to a thoughtful grower.

Mr. W. Cleghorn, Uralla, suggested that the department should introduce some such system of test sample manures as was in vogue in Victoria, and by which growers could ascertain for themselves the qualities which were deficient in the soil.

The Director: A complete description of this process had been written, and would appear in the *Gazette*, and a copy be furnished to each delegate. He had arranged with two firms—the Sugar Co. and Messrs. Elliott Bros. to provide the necessary samples for 15s. a set. The department intended taking steps to insure the purity of these manures.

Mr. Kyngdon, Sydney, inquired if any delegate could give information with regard to the cultivation of the fig. This was a fruit which was most difficult to obtain in the Sydney market, yet he understood it grew luxuriantly in the Western districts.

Dr. Fiaschi, Richmond, said that about eight years ago he imported from Italy what were considered the best kinds of figs. He had grown them on the Hawkesbury River with great success, obtaining a fruit as luscious and full of flavour as any to be obtained in Italy. The secret of fig-growing was that the tree required a very large proportion of potash. In the old countries it was the rule of the peasantry to throw all their spare ashes round the fig trees. He found that the birds interfered very much with the cultivation of the tree, and consequently he had refrained from prosecuting their culture on a large scale. The best of all was the white Adriatic.

Mr. A. Hunter, Gosford, said that in the district he represented, trenching was of little use. He had found it necessary to drain to a depth of 4 ft. 6 in. The soil on the elevation was a yellow sandy loam, with a loose underlay and a sandstone bottom. The lower land was very rich, a little too rich in fact, and it merely required ploughing and planting. It was a sandy loam, not of great depth, but with plenty of vegetable fibre intermixed. Most of the English varieties of fruit, and many of the American varieties of apples, flourished exceedingly well.

Mr. J. Hayes, Singleton, said the cultivation of the peach had been greatly retarded by the aphis pest. He had tried many remedies, and, with one exception, they had all failed. The only effectual specific he found to be a mixture of lime, sulphur, and sulphate of copper, which he applied in the winter time. The proportions were three parts of lime, one part of sulphur, and half a pound of sulphate of copper, dissolved in about 4 gallons of water.

Mr. W. Bridle, Tumut, agreed with the remarks Mr. Scobie had made as to the land, which did and did not require trenching. The alluvial formations, at Tumut for instance, required much less cultivation than those at higher elevations. The delegates ought to be thankful to Mr. Stieme for the illustration of pruning which he had afforded them. He had pruned the peach-tree in a way which would prevent it bearing too many fruits which exhaust the tree more than anything else. Under a good system of pruning the fruit would be finer and of better quality. There was a great deal more in pruning than some persons would have them believe. He was delighted at the information which some of the delegates had given, and he believed the Conference was one of the best steps that could have been taken to develop the fruit interests of the Colony.

Digitized by Google

Mr. C. Gambling, Thornleigh, in giving his experience of draining, said he found the best test was to dig a hole 3 or 4 ft. deep; if water remained in it several days it was a sure sign that the land required draining. In planting orchards the utmost care should be taken. He gave plenty of room for each tree to develop, and he had so carefully drained the soil that it was possible to work it immediately after a heavy rain. Before he drained his orchard he lost a number of lemon-trees, but after draining he had only lost one tree in seven years. First of all he laid in inch pipes, but subsequently he found an inch and a half to be preferable.

Mr. Rogers advocated the use of 2-inch pipes.

This closed the debate.

Digitized by Google

Planting of New Orchards and Vineyards.

Cultivation of the Grape Vine.

E. WHITAKER, Parramatta.

In treating of the culture of the vine in New South Wales it may perhaps appear superfluous to many of my hearers to offer any remarks upon the subject of climate. Certainly it would be difficult to find a climate more propitious than that of the county of Cumberland. In it exist sites composed of a great variety of soils favourable for the cultivation of the vine either for wine-making or table use, though the climate in some parts brings the grape to maturity much earlier than in others, and although the qualities sought for in grapes as a fruit for the table are exactly the reverse of those required for making good wine, yet there is no part of the county of Cumberland in which the grape vine cannot be successfully and profitably cultivated under good management for one or other purposes. Of all the plants which cover the surface of our globe there is, perhaps, none more sensible of the action of the numerous causes which influence vegetation than the vine. Not only do we see it varied under different climates, but even in the same climate we see its products changed in the most astonishing manner, in consequence of a difference in the nature of the soil, the exposure of the vineyard, or the system of cultivation pursued in it. Causes which have no perceptible effect on other plants act so powerfully on this as to seem to change its nature. We have instances of the grape vines of the same variety, cultivated in the same manner, and in the same district, differing considerably in consequence of a slight difference in their exposure or of the slope of the hill on which they are planted. Were we to judge of the vine by the strength of its vegetation, or the quality of its fruit, the effects of these causes would be much less perceptible—our senses would frequently establish very slight shades of difference; but estimating their effects by a comparison of the wines made from their fruits, we are only the more sensible of the differences as our taste for this beverage becomes more exercised or refined. Before, then, we can determine the causes why the same kind of plant does not produce everywhere, indifferently, the same quality of wine, and establish principles by which we shall be able to foresee and announce that which ought to be, as well as to account for that which is, it is necessary that we should examine separately and with care what is due to each of the causes which most strongly influence the vine and its products. All climates are not favourable for the culture of the vine. If it grows and seems even to vegetate with force in the colder climates it is not less true that its fruit never attains a sufficient degree of maturity, and it is an observation which constantly holds just, that beyond the 50th degree of latitude the juice of the grape is not capable of undergoing a fermentation to convert it into an agreeable drink. The flavour, and especially the saccharine principle of the grape, are effects of the uninterrupted rays of a powerful sun. Where the sun's rays are less powerful and constant the sour or acrid juice, which develops itself in the grape at its first formation, is not sufficiently elaborated, and does not lose its primitive character of greenness,

Digitized by Google

before the return of winter arrests its further progress of maturity. The unripened grape contains scarcely any sugar, and the expressed juice, when fermented, yields a sour liquor, in which the alcohol scarcely exists in sufficient quantity to impede the movements of a putrefactive fermentation. The vine, like every other production of nature, has its appropriate climates, and, in general, it is only between the 35th and 50th degrees of latitude that it can be cultivated with advantage; if it flourishes at a lower latitude than 35 degrees, the heat of the climate must be modified by natural causes, or artificially by means of irrigation. Warm climates, in favouring the production of saccharine matter, generally produce strong spirituous wines, sugar being necessary to the formation of alcohol, while those produced in colder climates are characterised by their want of strength. The vine grows everywhere, and were we to judge of the quality of its produce by the vigour of its vegetation we should prefer for its culture the most fertile and best manured soils, but experience proves that the quality of the wine bears little relation to the luxuriance of the plant. Nature has reserved for the vine, dry, light, and free soils, especially those of a calcareous nature; but although the lighter and more porous soils are best suited to the vine, it must not be inferred that the vine will not grow in any other, for we can all bear testimony to its luxuriant growth and abundant crops in rich and moist ground in various parts of the Colony; yet a light, dry, pebbly, or gravelly soil, into which rains and dews can readily penetrate, and its roots extend themselves freely in all directions, is that which is best adapted for the cultivation of the vine, provided it is so situated as to receive without obstruction the rays of the sun. Rich argillaceous soils are, in all points of view, improper for the vine; their firmness prevents the dissemination of the minute fibres of the roots, and their coldness is prejudicial to the plant. If a light shower falls it is evaporated before it sinks beneath the surface, and the same coherence, which prevented the entrance of a less degree of moisture opposes itself to the evaporation of those heavy rains which penetrate deeper; thus the root seldom receives moisture but in excess, and the air and heat finding the same obstacles to their entrance and circulation as the water, a perpetual coldness in the soil checks the vigour of the plant or an excess of moisture rots its roots and causes decay. There are, however, soils rich in nutritious substances, which, containing a larger proportion of siliceous or calcareous matter, do not partake of the hurtful qualities of those in which argil predominates. In these the vine grows freely, but this very strength of vegetation is essentially hurtful to the quality of the grape, which with difficulty attains to maturity, and produces a wine without strength or flavour. If, then, a rich soil is free and open, the vine planted in it flourishes vigorously, producing in abundance a wine, weak, watery, and destitute of perfume; but in wet and humid soils of every description it languishes and dies. In my opinion there are soils in Australia not yet under cultivation which are capable of producing as fragrant wines as any in the world, and if these soils were brought under cultivation our fame would be establised as a wine-producing country. At the present time there are only about 7,000 acres under vines in New South Wales for all purposes, planted principally in soils capable of producing large crops. Suitable soils are prevalent throughout the Colony for the cultivation of the vine. In the districts of Parramatta, Liverpool, Ryde, Camden, Appin, and in many other parts we have light, free, blackish or brownish soil lying over shale with an intervening stratum of mild clay, containing portions of ironstone or shale. There is also a light red or brownish loam, resting upon a stratum of mild red clay, with a very loose friable shale underneath; many

Digitized by Google

parts abound with this soil, in some parts without the clay. In many parts of the county of Cumberland I have noticed a reddish or brownish loam, resting upon a stratum of mild red clay, which gradually passes into a decomposing sandstone. I took particular notice of a patch of this kind of soil in passing through Seven Hills the other day, and was surprised that it was not turned to better account. In other parts of this county we find a soil consisting of a deep light red sandy loam, intermingled with very small ironstone gravel, gradually passing into a subsoil of ironstone gravel, intermingled with ferruginous sand, and at a depth of several feet a stratum of clay. This is an excellent soil both for quality and quantity of produce, as may be seen by the vines growing there and from their produce. Then we have on the banks of our rivers light sandy loam of alluvial formation and tolerably fertile, which is favourable to the growth of the vine, and yields large crops.

The most favourable aspects for the vine in this Colony are probably more from east to north. In the county of Cumberland, a north-eastern one, sheltered from north-west to south-east, but it is rarely we meet with a site containing every advantage; the great object is to have the vineyard open to the full rays of the mid-day sun without being exposed either to hot winds from north-west, or to any of those strong land winds so prevalent in the spring. Violent winds are apt to break off the young shoots, and produce great damage at the periods of the flowering and ripening of the fruit. No sheltering trees should be planted nearer than 40 or 50 yards. We know from experience the disastrous effects of having them nearer. After having chosen a site for a vineyard the land should be effectually drained to a depth of 4 feet, by means of drain-pipes or rubble stone. I prefer 2-inch porous tile pipes, which, during the last fifty years, have been brought to a high state of perfection; but care should be taken in laying the pipes in close contact on a smooth surface in straight drains. The land should then be trenched from 18 inches to 2 feet, according to the nature of the soil; to complete a vineyard here, in the county of Cumberland, will cost from £30 to £80 per acre, according to the plan adopted, whether done with manual labour or the plough, though some are following a system of scratching the surface to a depth of 11 or 12 inches at a much less cost; such a trenching depth is not enough as the vine is a deep-rooter. I have always been favourable to the quincunx principle of planting where the stake system is adopted, but the distance apart the vines have to be planted can only be regulated according to the varieties. The Pineau family require less room than any other short-jointed variety I know, though they even should not be planted closer than 5 ft. x 4. Some writers consider this a waste of room, and we too frequently find them planted 4 ft. x 3. None of the longer-jointed varieties should be planted closer than 6 ft. x 6 ft., that is, if the stake system is adopted. I, myself, prefer the wire and the vines planted at such distances as each variety requires, ranging from 7 ft. x 7 to 8 ft. x 10; this permits the application of all means and the use of all instruments worked either by hand labour or by horses. The employment of horses in working vineyards is of considerable importance as a measure of economy. To illustrate the space a grape vine will cover, notice the one trained along the balcony on the Bank of New South Wales, Parramatta. There is a difference of opinion among practical men as to the expediency of planting cuttings or rooted vines. I prefer cuttings, and under good management very few will fail. I give this method the preference because I believe that where a cutting first strikes root it will make a stronger and healthier plant, and live longer. There is a maximum of space under which the vine cannot obtain its necessary physiological development, and observa-

Digitized by Google

tion has demonstrated that in less than one square yard of ground the vine will not retain its bearing capabilities without fertilisers. Judicious manuring does not alter the taste of the grapes, neither does it lower the value of their juice, but when used excessively it deteriorates their quality. Close planting does more injury to the grape than anything else. I know for a fact that wine made from Verdeilho grapes when 10 or 12 years old was superior to that made from them when 40 years old, which can only be attributed to their close planting—5 ft. x 3 ft. 6; and the same with the Cabernet-Sauvignon. Yet there are varieties that will continue bearing heavy crops of grapes without the aid of manure; and when fertilisers are used they only tend to lessen their bearing properties such as the Wantage, whilst there are others that will stand any amount of forcing, such as the black Hamburgh. On the variety of vine employed depends the character of a vineyard as a wine-producing one. The soil indubitably raises or reduces the quality of the wine. It also gives to it a special taste and bouquet; but of the large number of varieties introduced in this Colony they have been reduced to a few—as well adapted to the Colony for wine-making, among which are Black Burgundy, Black Frontignac, Sauvignon Cendre, Gonias, Reisling, Verdeilho, Shiraz, Malbec, Cabernet-Sauvignon, Mataro, Blanquette, Aucarot. These are the varieties that are principally cultivated here for wine. With respect to those grapes for table use, I have successfully cultivated the Black Muscat of Alexandria, White Muscat of Alexandria, Ingram's Hardy Prolific Muscat, Madresfield Court, Mrs. Pince's Black Muscat, Venus's Black Muscat, Black Frontignac, Red Frontignac, White Frontignac, Dr. Hogg, Waltham Cross, Canon Hall Muscat, Syrian, Royal Vineyard, Barbarossa, Golden Champion, Black Corinth, Royal Ascot, Lady Downes, Golden Hamburgh, Duchess of Buccleuch, Duke of Buccleuch, Black Prince, Aramon, Common Chasselas, Turner's Black, Bowood Muscat, Ulliade, Baxter's Sherry, Trentham Black, Stillward's Sweetwater, Red Prince, Black Hamburgh, Pedro Ximenes, Raisin des Dames, Raisin Monstrueux, Wantage, Golden Queen, Large White Sherry, and Cambridge Botanic Garden. These are all first-class table grapes that I have selected out of some hundred and fifty varieties that I had as worth cultivating, but there is a great difference in their comparative value for commercial purposes. Probably Turner's Black will prove the best for exporting. There is, however, a grape called Black Sherry, which has not been successfully exported, but which will not pay for cultivating; although it has a thick and touch skin it is very liable to burst with the least rain. With regard to the American varieties, I imported some twenty-five, all of which are strong luxuriant growers, subject to no disease, and would make good stocks for grafting. I cannot speak favourably of their fruit. There is one point that I forgot when speaking of manure, that is, that the manure should not be put near the surface. When it is deposited on or near the surface it is a cause of disadvantage and disease to the vine. The weeds grow rapidly and in large quantities, and these maintain a dampness unfavourable to the growth of the vine, and deprive it of sun and air. They cause the dropping of the blossom, and are opposed to the development and maturation of the grapes, and absorb the best part of the manure. The small roots of the vine are encouraged to the surface, where they grow rapidly, and are exposed to the mutilation of the hoe and the droughts of summer, and stable manure should only be used in the autumn, never in the spring of the year. Manures which take a long time to decompose are the best for the vine. I do not approve of deep digging in a vineyard. I have arrived at this conclusion from noticing the vigorous growth of grape vines growing on the

Digitized by Google

borders of walks, and on examining them I have found the roots larger and healthier than those in the beds, which leads me to believe that the vine thrives better under a firm surface than a loose one, so long as the soil beneath is of the right kind. If the surface is moved a few inches that is all that is necessary. Humidity and freshness are only favourable to the vine at a great depth, where its roots seek for them. For that reason deep cultivation is unnecessary, especially in light soils. In concluding this paper, I must offer a few remarks on pruning, but to go into its theory properly would take more than the time allotted for the reading of a paper. On no account should pruning be commenced till vegetation is completely suspended. The later the pruning can be done the better—it enables the pruner to judge the vine with more certainty. Pruning can be reduced to such a simple precept that everybody can practise it. The first year after planting cut off, close to the stem, all the branches but one, the most vigorous and the nearest to the ground, leaving one, two, or more eyes according to the strength of the stock. The object of the pruner should be chiefly directed to the creation of abundant deeply seated roots and the enlargement of the stem at its junction with the roots. Each vine should be opened round and all surface roots removed to a depth of some inches, in fact this should be done every year, no matter how old the vines are, and a little lime and sulphur put round them. I used to use gas lime when I could get it, and found it excellent. The muscats and other varieties subject to spot I always gave salt and lime, and ducted them in the spring with sulphur and lime; the sulphur checks the oïdium, and the lime the black spot. A strong solution of sulphate of iron has also been successfully used, but it should only be applied when the atmosphere is damp. The second year's pruning is similar to the first, cutting off all shoots but the best one; the third year you begin to form the head of the vine, and the fifth year it is formed, under the stake system, and will then produce as much fruit as ever it will. With this close system of planting you cannot allow a vine more than six or eight shoots. Training on wire 6 or 10 feet apart and about 5 feet high will take a little longer to fill the palisade, but at the end of ten years you will have stronger vines and a better return for your outlay. It must be borne in mind that one kind of pruning will not do for all varieties of grape vines; some require longer pruning than others: For example, the Mataro will produce but a small quantity of grapes if pruned long, whereas the Black Frontignac will bear abundantly, though whatever style of pruning is adopted with the young vines at first should be continued. Nothing is more injurious to grape vines than to be continually changing the method of pruning. Nothing tends to exhaust a vineyard so quickly as injudicious pruning. All pruning should be done clean, either with the knife or shears; some object to the shears; they contend that it bruises the wood. The vine is too robust to suffer from any crushing by the shears. More can be learnt in one day by seeing an experienced pruner at work than would be gained by reading volumes, which is one more argument for the establishment of a Viticultural College.

The best distance for planting vines.

DR. FIASCHI, Sydney and Richmond.

One of the most important questions in viticulture is that of the distance at which vines should be planted. In this Colony vines were first planted, according to the European system, closely; 4 feet between the rows and 3

Digitized by Google

or 4 feet between each vine; but in such short distances hand cultivation was necessary, and the high rate of wages ruling in Australia made such a system unprofitable. Consequently, the distances between the rows were extended to allow cultivation of the soil by horse power, and 6 x 6 ft. became the generally accepted distance. Some of the best vineyards on the Hunter are planted at such distance, and the same may be said for many of those vineyards in Europe where cultivation by horse power has been adopted. Of late, however, the tendency in this Colony has been to further extend this distance. Some of the writers on agricultural matters in the weekly papers have recommended 8 x 8 ft., and from conversation with several of the vine-growers, both on the Murray and on the Hunter, I gather that this distance is the one that meets with the greatest approval just now. The chief reason for its popularity is that, through allowing more ground to each vine, these grow vigorous as regards wood and foliage; and, to quote what the advocates of such a system say, land is so cheap out here that it makes no difference how much more surface you give to the vine so long as it thrives. Such an argument is deceptive, for on consideration we find that no attention is paid to the quality of the grapes and wine resulting; also that the first cost of the land is a very small item in the expenditure of forming a vineyard. All experienced vine-growers know that where the money runs away is in the drainage, the fencing and wire-netting against noxious animals, in the annual cultivation, clearing of the soil, and war against oïdium and other cryptogamic diseases, ultimately in the protection of the crop from all marauders, these ranging from caterpillars and birds to the petty agricultural pilferer. All these items of expense, with the exception of the defence from fungi, are proportionate to the surface, and not to the number of vines planted out. Obviously, fencing, wire-netting, and draining 64 acres, instead of 36 acres, means an increase of more than two-thirds in the expenditure. The same may be said for the cultivation of the soil; and in speaking of cultivation, let me say that a ploughman accustomed to plough in vineyards will have no more difficulty to plough in one planted 6 x 6 ft. than in one at 8 x 8 ft.; so that, as regards ease in the cultivation by horse power, there can be no real advantage gained in the former system of plantation. If, then, the chief items of expenditure are proportionate to the amount of surface on which the vines are planted, do we find that, by increasing the space allotted to each vine, we obtain a greater yield or a better quality of the wine produced, sufficient to compensate greater cost? I think not, for as regards yield, an 8 x 8 ft. plantation may be made to give a maximum production equal to that of one 6 x 6 ft., but no more; and in doing so you will have to adopt measures that will lower the quality of the wine.

Taking the two usual methods of training vines—if you have them on stakes, in the so-called gooseberry bush system, to make each vine yield grapes in greater quantity proportionate to the greater area allowed to each, it would be necessary to leave a proportionately larger number of spurs in the ratio of 64 to 36 or 16 to 9. This means, that with an increased amount of grapes you inevitably have an increased amount of foliage on that circumference whose centre is the stalk of the vine, which in no manner can be enlarged. This increased foliage, by crowding and overshadowing the grapes, deteriorates the quality of the juice. All practical vine-growers know that there is a certain maximum number of eyes that can be left on vines trained in this fashion, beyond which one cannot go, without producing inferior wine. This maximum is obtained in the 6 x 6 ft. distance, so that as regards staked vines, to extend the distance between them, signifies diminution of quantity or of quality. With the trellis system one would

Digitized by Google

think that by extending the main rods or lengthening the spurs springing from them, one would be able to increase the yield without affecting the wine, for there is ample space for the foliage, and there can be no overshadowing from excessive foliage. We find, however, that the greater distance to which the sap has to travel affects the quality. Such a statement seems strange, when we consider the fact that vines trained along verandahs or upon trees, where the sap will travel 15 or 16 or more feet, still produce fine grapes. But in all such cases it is an invariable rule that all successful gardeners rub off all the buds along the ascending portion of the stalk, and that the bearing portion of the cane does not ever extend more than 5 or 6 feet. The distance that exhausts a vine is not from the soil to the bearing point but from the first point of production to the last. A vine will bear better fruit ascending 10 feet, and then having only a bearing distance of 5 or 6 feet, than ascending only 1 foot and having a bearing distance of 8 feet; and this statement is not a theoretical preconception but the result of what I have many times observed, at my own cost. The greater part of my vines are trained on trellis, and pruned either on a long horizontal spur, Guyon's system, or on a long permanent horizontal cane, with from four to six vertical bearing spurs about 1 foot long (Cazenave's system). Although the distances are carefully given, it has often happened that careless workmen have lengthened beyond my order, either the horizontal spur in the first system, or the vertical ones in the second, and I have invariably found, as a result, grapes smaller and poorer in glucose. This also, not only in the 6 ft. x 6 ft. distance, but also where, through neighbouring gaps, the surface in possession of the vine was very large.

The quality of the wine may also be affected by the fact that, where too much ground is given to each vine, the wine presents that peculiar earthy taste so much objected to by all good judges of wine, known by the French name of *goût de terroir*. Such a taste is very often found in the wines of young vineyards, and as these get older, and to a certain extent exhaust the soil, it disappears. The renovation of the soil by means of judiciously-prepared manures, whilst keeping up the quantity of produce does not bring back again the old *goût de terroir*. It is thus easily understood how, by planting your vines too far apart, this particular defect will be more marked in the wine, and last longer.

The quality of wines should also be considered. As Mr. Whitaker wisely remarked in his paper, certain varieties, such as the Pineau, are plants so small in size that a distance of 6 feet between the rows and 4 feet between the vines is quite enough for them. To these I would add those kinds that do well only with very short pruning, such as the Mataro or the White Shiraz.

These remarks of mine apply to all the vine-growing districts of the Colony; still, it may happen that in certain favoured localities, where the soil is deep and naturally drained, where hares, rabbits, and birds are absent, and an excessive dryness of climate prevents the growth of weeds and of mildews, the 8 ft. x 8 ft. distance may not prove an economical error. It will, however, prevent the wine from attaining that excellence of quality, of which through the merits of the soil it would have been capable. In all other localities not having such advantages, such as the coast districts, and the county of Cumberland in particular, where soil is dear and the cost of preparing it great, I strongly advise intending planters not to be swayed by this temporary wave of fashion in favour of the 8 ft. x 8 ft. Let them keep to the 6 ft. x 6 ft., which is, in my opinion, the best average distance, and is the one that, for the money and labour expended, will yield the best results, both as regards quantity and quality of the wine produced.

Digitized by Google

Planting Vineyards.

SAMUEL M'WILLIAM, Corowa.

In this paper I desire to give you a short sketch of the planting of the vine in the Murray district, round Corowa, from the preparing of the land to the time when we reasonably expect to get a payable crop. Land in the police district of Corowa consists of a chocolate soil on a marly subsoil, sandy loam, and a rather lighter sand, both of which have a stiffish clay subsoil. All the varieties of soils have proved very suitable for the growth of those vines which produce rich fruity wines. The total area of vines planted in this district amounts to about 1,000 acres; 700 acres have been in full bearing for some years and the balance has not yet come into bearing. The oldest vines in this district have been bearing upwards of twenty-five years. The system of planting in those days was as follows:—The land was trenched at a cost of about £80 per acre, and the vines were planted 4 x 4 feet apart; now we find it only necessary to plough 12 inches deep, which can be done for 35s. per acre, and on the light, free, loamy soils, 6 or 7 inches is found all that is necessary, and that can be done at a cost of 12s. per acre; the ground is then laid out in squares, 8 x 8 feet, and, in some cases, 9 x 9; short pegs are driven in where the squares cross; a hole is dug to a depth of about 12 inches; the cutting is then placed in the hole in a slightly slanting direction; the top soil is placed round the bottom of the cutting, and gently but firmly pressed down. The best length for cuttings I consider to be from 16 to 18 inches, with five buds in each. In planting, we find it best to leave only one eye above ground, thereby presenting a smaller portion exposed to the heat of the sun; we find that if the top eye misses, the second eye is so near the surface that the shoot from it easily pierces the topsoil The cost of laying out, pegging, and planting amounts to 35s. per acre. Cuttings for all or nearly all varieties are procurable in the district at a cost of 10s. per thousand. The expense the first year for ploughing, hoeing, &c., I place at 35s. per acre; second year, pruning included, £2 per acre; third year, pruning included, £2 10s, per acre. A small crop is then expected covering about half the expense of that year; this you will find brings up the total outlay to some £10 per acre. Some varieties require staking the second year, which can be done for about £6 per acre. Of course the above figures do not include the value of the land, which varies in value according to locality. All varieties of grapes do well here, with the exception of Muscat of Alexandria, which, as a rule, when planted from cuttings, bears shily. The favourite kinds in our quarter are, for dark wines: Shiraz, Malbec, Brown Muscat, Roussillon, &c.; for white wines: Pedro, Gonais, Reisling, Aucarot, Tokay, and Chasselas; and for drying purposes we find Muscat of Alexandria and Zante Currant the best, especially the latter, as it ripens early and is very easily dried, having simply to be exposed to the sun for three or four days on corrugated iron, and the operation is then complete; but at present very little drying is done, except for home consumption, the want of proper appliances and the scarcity of labour preventing us from competing with the imported article. All kinds of table grapes do well here, especially Black Prince, Muscat Hamburgh, Black Hamburgh, Silver Champion, Merillien. Some years ago a considerable trade in table fruit was done with Melbourne, but, for the past two years, as you may be aware, we have been excluded from this, our only market.

What we want is training in our business, and, if I may be allowed to suggest what I consider to be the best plan, I would be in favour of an

Digitized by Google

agricultural and viticultural college, where our boys could be sent on payment of £25 per year, and give their labours for a period of four years; they would then get a thorough knowledge of the business, and could then return home and teach their brothers. I would also suggest that a local board of advice be appointed, so that if complaints of management were made a local inquiry could be held and the particulars sent to the head of the department. I consider that, with proper management, the college would be self-supporting in five years. We don't want to use the State as a wet nurse for any length of time. Cheap and quick transit to market is also badly wanted; although we are in the home of the vine, we are a long distance from the market.

The whole of the country on the Murray, in the South Riverina, and for a distance of 30 miles back, is well suited for the growth of vines and fruit-trees and only wants developing.

Some Practical Hints on Viticulture.

JAMES BEATTIE, of Brooklyn Vineyard, Wagga Wagga.

THOUGH the vine-growing and wine-making industry in New South Wales is yet only in its infancy it exhibits so many signs of vigorous healthy life that we are able, with confidence, to predict for it a future of considerable importance. In my own opinion, founded on years of practical experience, it bids fair, at no very distant future, to rival that of wool-growing, both in the value of its exports and in respect to the employment of labour and capital.

New South Wales possesses all the natural resources necessary for the development of a great grape-growing and wine-producing industry. These are provided in the large areas of land, whose soil, whether composed of limestone detritus, sandy, or ferruginous formation, is capable of producing grapes of excellent flavour and quality, either for table or wine-making purposes, while, in addition, she has a climate second to none in the world for the proper development and ripening of the grapes for whatever purposes they may be required, whether for wine-making, table use, or raisin preservation. I add the last advisedly; though, so far, as an industry, it has not had a beginning in this Colony. In other words, New South Wales needs only the intelligent application of capital and labour to turn her vast natural resources of soil and climate to account in the shape of a large export in wines, and a suitable market for the wines when produced, to build up an industry capable of rivalling similar industries in European countries, and, at the same time, provide healthy and remunerative employment for a large proportion of her population.

The attention which has of late been directed to Australian wines on the other side of the globe, owing, in the first place, to the partial failure of the grape crop and the destruction of entire vineyards in France, as the result of the ravages of the phylloxera pest, and secondly, to the excellence of our wines exhibited and sold at the Exhibitions in London and Paris, may be accepted as an indication that a market for them on a scale sufficient to vastly accelerate the progress of the industry may confidently be looked for in the near future.

The present conference of delegates from the various fruit-growing centres, convened by the Minister for Agriculture, will, I feel sure, prove a very great step forward in the direction of consolidating and developing an industry whose future cannot but be of vital importance in its bearing on the material prosperity of the Colony.

Digitized by Google

The prospects of the wine-growing industry in the Wagga Wagga District.

A large proportion of the soil in the district, which I have the honor to represent at the present conference, being of a light, friable nature, easily worked, and yet capable of retaining a good deal of moisture at a short distance below the surface, is rendered theoretically suitable for viticulture; and experience has proved it to be so practically. In some cases the soil is loamy, in others sandy, but more frequently it consists of a mixture of one or both of these, with soil of a ferruginous nature. The latter is noticeable by its reddish appearance, which deepens in some cases, through the addition of alluvial deposits, into chocolate or brown. That such soil is eminently suited for wine-producing purposes is proved by the fact that the industry has been successfully carried on, notwithstanding the distance from other than a local market, for more than a quarter of a century. The Brooklyn vineyard was established by my father, the late Mr. Hugh Beattie, about twenty-one years ago, prior to which he successfully cultivated for several years a rented vineyard in the same district. During the time the Brooklyn vineyard has been in bearing not a single failure has taken place in the grape crop, and only in one season—that of 1879—was there a considerable falling off from the average yield. In one season only during those years—that of 1888—was the crop, when ripe, injured by the weather. In the former case the falling off was occasioned by excessive drought, and, in the second, an unexpected rainfall impaired the quality of some kinds of the wine grapes. In 1879 no rain fell from the time the berries formed until they were ripe. As a consequence, the crop was scanty and the berries small. For wine-making purposes, however, the quality was in no way inferior to that of the yield in other seasons.

Wines sent from Wagga Wagga to the Indian and Colonial and other exhibitions have taken prizes in competition with wines from the older countries.

Altogether, the experiences of my late father, combined with my own, tend to prove that the district of Wagga Wagga, in regard to its natural resources, is eminently suited for grape-growing and wine-making purposes. The chief drawback to its rapid extension at present is the want of an adequate market for its wines, and, though to a lesser extent, for the table grapes, the local demand being more than met by the present rate of supply, and the cost and other difficulties in the way of transport having so far been a serious impediment to the opening up of a market elsewhere.

Hints on laying out a Vineyard.

The soil for vine-growing purposes, as I have incidentally shown, should not be too rich. A light, friable, but not poor soil, is the best, while a heavy adhesive soil is totally unsuited for the purpose. The situation should be a slope, with, if possible, an easterly aspect. If this cannot be obtained, a south-easterly aspect should be chosen. In that way the vineyard not only gets the beneficial effects of the morning sun, but is sheltered from the worst effects of the hot winds from the west, and also from the more scorching effects of the afternoon sun.

The ground, if new, should be ploughed twice with a trenching plough. The first ploughing should take place in Autumn, and the second, which should be cross ploughing, should take place immediately before planting, or about July. The ploughing should be to the depth of about 9 inches, and should in no case exceed 12 inches. This is far preferable to the old method of deep trenching, which was pursued under a mistaken idea, with regard to

Digitized by Google

the process of assimilation, by the plant, of food matters from the soil. According to the old method, a deep trench was dug, into which the soil containing most of the elements of plant food was thrown, and the soil lacking those elements brought to the surface—in that way, it was thought, supplying the roots with all the food they required. A truly excellent plan, if plants had the power to absorb their food in a solid state, but rendered almost useless by the fact that they have not that power. An exactly similar method of feeding an animal would be to supply the stomach with a quantity of solid food, by making an incision in the œsophagus, or in the walls of the stomach itself. The consequence of such a method of feeding would be that the animal, though filled to repletion with food, would die of starvation. Similar results followed the old method of trenching in all cases, where they were not obviated by a top dressing of manure, or by certain means, still left in natures power, to prevent them. As plants can only take up food matters from the soil, in a soluble state, and this state can only be produced by their absorption by water surcharged with carbonic acid, it follows that such matters must be exposed to the action of the atmosphere, in order to properly carry out the work of absorption and assimilation.

I will give an actual instance which illustrates my meaning exactly. Some years ago I laid out a vineyard in a district some miles distant from Wagga Wagga, but with a soil and climate very similar. The ground, which was virgin soil, I ploughed in the manner I have described, and after careful harrowing, made holes about 9 inches deep, in which I planted cuttings. 99 per cent. of them took root, and the vines, as long as the vineyard remained in my hands, throve well. A neighbour of mine planted out a number of cuttings the same year, laughed at my method, and followed one he considered infinitely superior. It was to dig a hole for each vine—or what he confidently expected would one day be a vine—several feet deep, into the bottom of which he emptied a barrow load of dry manure. Then followed the top soil, taken from the hole, and lastly, the poor soil, taken from the bottom. Into this he joyfully inserted his poor little cuttings, no doubt expecting that, by some mysterious process, the food elements, carefully stored in the bottom of the hole, would *rise up* to supply the needs of the plantlet above. Being neither able to set at defiance the existing laws of nature, nor to set up a new one on their own account, they remained where they were, notwithstanding the great straits to which the poor plants were in for lack of them. The natural consequence was that not one of the cuttings took root. The most they were able to do was to put out a few sickly leaves; some did not do even this, and they all died of starvation.

The ground having been ploughed and carefully harrowed, the next proceeding should be to put in—not the cuttings, as is so frequently done—but the stakes to which the future vines will need to be trained and tied. Some leave the staking till the second year, which is a serious mistake. In the first place, staking before planting the cuttings is an absolute necessity, in order that the rows of vines should be perfectly straight from whatever point of view they may be looked at—that is, they should form straight lines from the four sides of the bed, and diagonals—the direction of which should also be straight—viewed cornerwise. This perfect regularity is necessary, to allow the scarifier to do its work of uprooting weeds. For their legitimate purpose too, stakes are necessary the first year, as the plant will be more shapely for tying up, and will be less liable to injury from the wind. It is just as necessary to train up a vine in the way it should grow as it is to train a child, so that when it is old it will not depart from it; and it is impossible to begin too soon. Yet many people seem to hold the opinion

Digitized by Google

that a young vineyard may be left to itself for the first couple of years, and that, when it begins to bear it will be time enough to think of giving it care and attention. Next to starving it at the outset no mistake could be greater or more injurious to the future wellbeing of a vineyard. Furthermore, it is necessary to put in the stakes before planting the cuttings, for in putting them in afterwards the roots are disturbed or injured in other ways. The stakes themselves should be strong, of durable wood, and should not be sharpened at the end. Sharpening at the end inserted in the ground is often resorted to in order to drive the stakes a sufficient depth without the necessity of digging holes. In that case, not only does the stake need renewing much sooner but its usefulness is greatly impaired, as it is apt to be blown over with the wind at a time when its services are most needed, and when its fall would do most injury to the vine.

The cuttings selected for planting should be about 2 feet long, and should be chosen with the joints as close together as possible, as it is only from the joints that the roots can spring. The holes for the cuttings should be about 20 inches long, a spade wide, and about 9 inches deep. The soil at the bottom of the holes should be broken up with the spade to the depth of about 3 inches. The cuttings should be laid in a horizontal position, lengthways in the hole. This will take about 20 inches of the length, while the other 4 inches, by bending, can be brought into an upright position above ground. This part of the cutting should contain not less than two buds. Only one of these will be actually needed to form the nucleus from which the stem of the future plant is to spring. But the two buds are necessary to begin with, lest one of them be weakly, or be blown or rubbed off. If both grow, the future stem should be selected from the stronger one, or, if both are equally strong, from the one in the better position for tying and training. When shoots reach a length of from 10 to 12 inches they should be carefully tied to the stake in such a way that the best chances for a shapely plant may be secured. A grape-vine after it is fully grown should have a stem from 9 to 12 inches long, and above this the branches, when pruned, should stand up in the shape of the fingers of a man's hand; that is, supposing the hand were held with the palm turned up, and the thumb and fingers then held vertically and a little outspread. The part of the vine corresponding to the heel of the hand should be turned towards the stake. In this way the fruit is not likely to be injured by being pressed against the stake when the vine is tied up. All this points to the necessity for great care in training the vine during the first years of its existence.

In pruning the vines from four to five branches are enough to leave on the main stem, and they should stand up from it, as I have already stated, like the fingers of a hand. The length should be from four to six inches, and each should have two, but not more than two, buds. From these two buds on each branch the wood for the next season is to spring. The pruning, unless it is done purposely in order to secure a late crop, should all be done before the sap begins to circulate. Late pruning, even with an avowed object, should, in my opinion, be resorted to very sparingly, for exhaustion of the vines will result, as "bleeding" always follows such a course. Each year, after the vines send out new wood, all superfluous shoots—that is, all weak looking shoots, and all in unsuitable positions for tying up—should be removed; also all shoots of whatever character springing directly from the parent stem. And, after tying up all shoots which grow above, the stakes should be kept within bounds by careful clipping. The stakes should stand up out of the ground to a height of 5 feet, and the branches should be so tied to them that the foliage should afford adequate shade to the fruit

Digitized by Google

underneath. If the foliage should, as the season advances, become too dense, it should be carefully thinned, to allow the sunbeams to do their part in ripening the fruit.

Opinions differ somewhat among vignerons in respect to the distance apart at which the vines should be planted. In no case, in my opinion, should the distance be less than 8 feet, while a uniform distance of 10 feet, each way, will afford still better facilities for working the ground between, and keeping it, as it should be, perfectly free from weeds. If planted too close together each vine becomes a weed to its neighbour, and, as a natural consequence, the crops suffer both in yield and quality. What is more, the ground soon becomes exhausted, and, if manuring is resorted to, the process is rendered more difficult than would be the case if the vines had been planted further apart.

With regard to nursery planting, in my opinion, it should only be made use of in cases where the ground, for the reception of the vines, is not ready, and for the purpose of supplying the place of such vines as fail to root.

A vine is in no sense improved by being put out to nurse, and should therefore be planted, if possible, where it is intended it should afterwards grow. At the same time, if the ground could not be got ready till too late to plant, by all means put them to nurse. In planting a new vineyard it is necessary to plant also a nursery of an additional 15 per cent., to supply the place, the next year, of such as may have failed to root, as it is advisable to have all the vines, in a bed, the same age.

Perfect cleanliness an absolute necessity.

Though I have already made my paper longer than I intended at starting, I cannot well close it without a few words on a subject of such vital importance to the wellbeing of a vineyard, as that of cleanliness. Not only is absolute cleanliness necessary for ordinary purposes, but it is also the best preservative from disease, no matter of what nature it may be. Parasites, whether insect or fungoid, are the result—primarily, if not in all cases—of an unhealthy condition of plant life, the predisposing cause of which is want of cleanliness. Fungoid growths are induced by the damp vapours arising from a too dense luxuriance of foilage, combined with the rapid decomposition of vegetable substances, going forward simultaneously with rapid growth. Everything, therefore, which constitutes a harbour for excessive moisture should be carefully removed, whether it is weeds, decaying leaves, or superfluous foliage. In spite of these precautions, if the situation is low and the season unusually wet, the disease may make its appearance, and can then only be combated by specific treatment, much in the same way as a doctor seeks to combat disease in a patient. But, while it is a good thing to know that a specific, such as sulphur for *oïdium* exists, it is a much better thing to be able to prevent the conditions which make its services necessary. And, where the situation for a vineyard has been chosen with that end in view, such diseases should not be difficult to keep entirely at bay.

Much can also be done, in my opinion, to keep parasitic insects, which attack the roots of the vines, at a distance, by a system of perfect cleanliness. The germs of such parasites are often laid in the decaying leaves, and other vegetable matter, that collect round the roots of vines in the autumn. These germs may, however, be prevented from reaching a condition of active life by very simple means. When the vines are pruned, which, for this reason, should be done as early as possible, the earth, to the depth of some 3 inches, should be carefully removed from round the roots of the vines, any

Digitized by Google

extraneous matter adhering to the roots to that depth carefully removed from it, and the whole should be exposed to the action of the winter frosts. In this way the germs are destroyed by cold, and the decomposition of the vegetable matter accelerated by the action of the atmosphere. It can then be returned to the roots of the vines before the sap begins to circulate, when, instead of being a predisposing cause of disease, it will be utilised by the plant. Or, in other words, the crop, instead of parasites, will be grapes.

The opinions I have expressed here are the results of my own experiences, following the teaching of my late father, to whom a weed, in a vineyard, was a thing to be ashamed of; and, being so, may claim to have a certain practical value, as far as they go. At the same time, as they have only had a local application, I do not wish to be understood to lay them down as rules to be absolutely followed under all circumstances.

As, for instance, the method of preparing the soil for a new vineyard, which I have found by experience to be the best in my own district, might not be the best where the conditions are different. In the deep alluvial soils of the coast district, or in cases where a sub-stratum of stiff clay was found to exist a short distance below the surface, deep trenching might be necessary; but, even so, the system of leaving the poor soil on the surface, could not result beneficially to the plants, for the reason which I have already given. That is, that the food elements, which need the action of the atmosphere for their absorption, are, by such means, denied access to it; and, though the greater rainfall of the coast district would, no doubt, lessen the evils which would otherwise follow, as by percolation, the rain, already charged with carbonic acid from the atmosphere, would pass to the soil underneath, containing the elements necessary to the growth of the plant; the system, in my opinion, has nothing in its favour. It does not follow, however, that it is a necessary result of deep trenching, to bring the poor soil to the surface, though, no doubt, without due care, it would be so; and, in many cases, the necessity for this care is not recognised, and possibly not understood.

Proposed Viticultural Colleges for New South Wales.

In closing, I may add that I feel sure the project of establishing Viticultural Colleges in various wine-growing centres is one that must commend itself to the community generally; but more especially must it commend itself to all who understand anything of the difficulties which beset the path of the vigneron in the early stages of his career. By distributing such colleges, for the teaching of practical as well as theoretical knowledge, many of the difficulties in the path of the beginner will be obviated; and the industry itself will be benefited by the application of knowledge, gained as the result of accumulated experience, combined with theoretical principles.

The Planting of new Orchards and Vineyards.

W. STIMSON, Fairfield.

I AM sure it will be admitted that this subject is second to none of the subjects set down for consideration. From my own observation and experience in this Colony, extending over a period of thirty years, I believe that a proper commencement of an important undertaking, goes a great way towards ultimate success; hence a wise man in building a

Digitized by Google

house, first chooses the best site, both for elevation and drainage, and best aspect, &c.; then he digs out for his foundation just the size to be profitable and convenient for him to build upon, after considering the cost; when that is done he will lay a good foundation, and builds upon that a good, solid, dry, and healthy house, always worth its cost or more. This, I believe, is the best possible way to plant or lay out an orchard or vineyard. First, if possible, secure a site with a nice and gentle slope towards the east or north. Such a site is exposed to the morning and afternoon sun, while it is somewhat sheltered from the hot and cold winds from the south and west. Then mark out the size and shape of the block you intend to plant. Do not try to do too much the first year—that is a mistake, and will result in a loss of time and money. Just mark out a piece of convenient size; for a small block thoroughly cultivated will pay far better than a large orchard badly laid out. In order that the young trees or vines may do well in either very wet or very dry weather, the moisture should be regulated, and this can only be done by cultivating and draining the land well. I believe that 2 acres, in a well-chosen site, well-worked and drained, and properly planted out with the kinds of fruit best suited for the soil and climate of the district, provided that it is kept in good order by manuring and pruning, will produce fruit of such a quality and quantity that the sales, after the expenses of marketing and working are deducted, will leave a larger profit than 10 acres badly cultivated, and planted with trees or vines unsuited to the district and requirements of the market. This can be clearly seen, when you consider it will necessarily cost far more to cultivate and look after 10 acres, even in an indifferent manner, than to plant and work 2 acres profitably. In the first years of my fruit-growing I thought and acted as I believe many young fruit-growers do. I was under the impression that the more trees and vines I could plant each year the sooner I should get a large return, so if I could not get a large block of land ready properly before the planting season, I used to dig holes and plant the trees in them, and dig between afterwards at leisure. If rain came on before the ground between the holes was worked to their depth, they held the water like a dish. The roots were injured, and many of the young plants died, while those which lived were far from healthy. Where the land is drained by means of pipes the trees will do better than where there are only open drains. Unless heavy loam is drained in wet weather it will get like mud, and when the weather becomes warm it gets baked quite hard, and cracks open. But when pipes are used the water can filter through the soil, and get away by means of the pipes. Then in two or three days after rain the land can be worked, whereas badly-drained land cannot be worked until more than a week after rain. In localities where the clay is only about a foot from the surface, 10 or 12 inches is deep enough to work the land for orange and lemon trees, which should not be planted more than 6 inches deep. For other fruit trees, which should be planted from 10 inches to a foot deep, it may be worked to a depth of from 14 to 16 inches. The tap root can be prevented from striking too deep into the cold stiff clay by placing a large flat stone or a slate in the bottom of the hole when planting. The land should be drained with 2 and 3 inch common drain pipes, 12 inches long, with open joints to receive the water, the former being laid on an angle across the slope of the ground in rows about 20 or 30 feet apart, according to the nature of the soil and subsoil, whether stiff clay or sandy loam; the larger pipes forming the main drains running straight down the slope, or down the depression between two slopes. The cross pipes should be laid in narrow drains, dug out with proper draining-tools, about 1 foot

Digitized by Google

deeper than the cultivated ground. The pipes should be covered to a depth of about 6 inches with tea-tree or some other kind of scrub, and then that should be covered with the top soil. The water can then filter through this to the pipes; but if the tea-tree is covered with clay the water cannot get away to the open drains, where the pipes empty themselves at the bottom of the slope. If there is no creek or good outlet there, pipes about 4 inches in diameter should be laid 2 or 3 feet deep, with junctions suitable to receive the down pipes, and an outlet must be made in the lowest corner of the land. The drainage plan of a single simple slope would resemble the bony skeleton of a herring flattened out. In trenching for vines where there is a red open clay subsoil you should go down 20 to 24 inches, but from 18 to 20 inches is quite sufficient where the subsoil is stiff yellow clay. The best way to trench a block of land is to commence at the lowest part and dig a trench about 2 feet 6 inches wide, depth as stated above. The soil from this trench should be carted away to be put in the last trench, for as you make the second trench you throw the soil from it into the first, and so on. The pipes, laid in the same way as for fruit-trees, should be put in 12 inches lower than the trenched land, as you go along. Then the whole of the soil should be broken well with a two-pronged hoe, for the vine cuttings seem to be better able to strike root in land broken in this way that in that dug over with a spade and left in lumps. The advantage of such a system of trenching is that when rain comes the water can get away readily from your work, and the loose soil cannot be washed away down the hill. In open loamy ground, such as the creek flats at Fairfield and the Orphan School Creek, if there are no stumps, trenching can be done with a plough, taking trenches 4 feet wide, or working two trenches together. First take out an 8-feet trench across the centre of the block, say 2 feet deep, cart half of the soil out of this trench to each side of the block, to be used for filling up the last trench on each side. Plough 4-feet trenches on each side of the 8-feet trench, and while the horses are ploughing on one side, there must be five or six men to break the clods and throw the soil, as it is ploughed up, on to the other trench. So plough and men work round and round after each other until the work is finished. This plan costs about half the price of hand-trenching on clayey ground. Open loam needs no drain-pipes, as the water can soak away from the vine roots, which can go down from 10 to 20 feet in this kind of soil. At Fairfield the vines, grown on the flats I have described, produce the largest grapes for table use, and the largest yield per acre in the district. But, on higher land, where there is a stronger loam with an ironstone or red marl subsoil, though the grapes are smaller in size, the flavour is richer, and they are well adapted for making rich wine, if the season is dry and the fruit gathered when quite ripe. I think the best way to plant the vines is on the German plan, with stakes 5 feet apart each way, or, if for wine, on trellises about 8 feet apart. These can be worked with horse labour. Trees may be planted from 15 to 25 feet apart, according to the size when full grown. If the soil is poor, 4 lb. or 5 lb. of bone-dust mixed with a little lime is very good to use when planting each tree. But, I believe, that if no trees or vines were planted at all during the first year, but the land were well ploughed, harrowed, and cross-ploughed, and a crop of oats or barley were sown, with a ton of bone-dust to the acre well harrowed in, not only would you get a splendid crop for green fodder but the land would be enriched by roots and stubble when ploughed in, and the trees or vines could be planted the next year. I have proved that, when this is done, not only are the trees and vines stronger but you obtain a good return sooner than when they are planted during the first year.

Digitized by Google

Laying out new Orchards and Vineyards.

JAS. WRIGHT, Rooty Hill.

FROM experience obtained as a practical gardener in Scotland, England, and Australia, I have found that the best land for orchards is that which has an incline steep enough to carry off the surface water without washing away the soil; an aspect towards the east, north, north-east, or north-west, and, if possible, in all those directions; and a soil of fertile friable loam, with a porous sub-soil if obtainable. If there is an excess of iron in the land, if salts inimical to vegetation are present, or if the sub-soil consists of pipe-clay, it should not be selected for an orchard. Having carefully selected the land, the soil should be analysed by an expert man, so that the proper fruit-trees may be selected by comparing the constituents of the land with those of the different fruits. The land should be carefully drained, in order to grow fruit to perfection. The drains should be cut from the higher to the lower level 3 feet deep, and as narrow as possible at the bottom, along which should be placed pipes 1 inch or 2 inches in diameter, according to the length of the drains, and the amount of water they would have to carry. About 9 inches of broken metal, or small stones gathered off the land, should be placed over the pipes, a good thatch of tea-tree over the stones. Surface should be made up with the good soil dug out of the drain, whilst the clay should be carted away. If the sub-soil is a heavy clay the drains should be 18 feet apart, but if open and porous, the drains should be 30 feet apart. These drains should be connected with a main drain or opened ditch. When the ground is drained in this manner it will be found that an excess of water will not be held within 2 feet of the surface. Nothing is apparently more paradoxical than the assertion that drainage is good both in wet and dry seasons alike. Yet it is good in both seasons, for the following reasons. By drainage, clay-soils are rendered porous, and the atmosphere is able to permeate the soil, thus bringing about excellent results, which may not, however, be observed the first year if the clay is very stiff and close. But, by the effect of summer heat, the clay will get dry, shrink, and crack, thereby leaving atmospheric conduits from the drainage. These conduits will never entirely close up again. The breaking up of the surface soil counteracts the influence of drought in many ways. One is that, below the level of the drain lies a mass of clay thoroughly saturated, on this is a mass of soil, rendered porous by the influence of the air admitted by the drain. This has a high absorbent power, which is a constant property of soil in a state of fine division. With the assistance of capillary attraction the water is pumped up from below to supply the waste from evaporation above. After draining and removing all the stumps the land should be ploughed and sub-soiled. At first it should be ploughed at from 18 to 20 inches deep, at right angles to the drains, and then thoroughly pulverised to a depth of 2 feet, with a cultivator, harrows, and roller, worked by bullocks, or, better still, by steam power. Hand-trenching is far too expensive for a large orchard. This should be done six or nine months before planting time, and during the summer it is necessary to go over it two or three times to sweeten the soil, and kill the weeds. Then a hare and rabbit-proof fence is required. In planting the stakes, 19 feet apart is sufficient room to leave for peaches and apricots, while for apples and pears they should be placed no less than 20 feet apart. Every stake should be in its place before planting time, so that no delay will be caused. About the beginning of June is the best time to commence

Digitized by Google

planting peaches and apricots. The trees should be placed about 6 inches distant from the stake on the northern side. Then, in tying, the heads are drawn to the south, and consequently a strong southerly wind cannot blow them against the stakes, and cause injury through chafing.

Before the young trees are put in the ground, broken or bruised roots should be cut off. The heads should be cut well back, the small twigs to one bud, and the larger branches to two or three buds. Such a method is of great benefit to the trees. A shallow hole should be dug, wide enough to allow of the roots being spread out nicely. The soil used for planting in should be taken from between the lines of stakes where the furrow is made by the plough. It should be taken as long before required for use as possible, and thrown up in little pyramidal mounds on each side of the stake, clear of the space required for planting. This process is not a laborious one, and it is of great advantage. The soils becomes sweetened and dried in a very short time, and when once dry, owing to the way the mounds are thrown up, rain has but little effect upon it. Then in planting in a wet season, instead of having to work in wet and sodden soil, the orchardist can use the dry stuff, and so perform the work easily and quickly.

When the land is worked by steam-power it is better to plant the trees almost on the surface. For when the land is afterwards ploughed near the trees it raises the surface, and at the same time leaves a gentle slope from the trees towards the middle line between them. This prevents the surface-water from settling about the stems of the newly-planted trees.

The following plan is recommended to any intending planter:—Trench an acre or two by hand. After draining break up the bottom spit thoroughly with a steel fork, and do not leave any loose pieces of sub-soil between the trenches. It will be all the better if manured, and cropped with something one year before planting. Get apples on the Paradise stock, twice worked of course; pears, on the English; quinces and cherries, on the Mahaleb stock or perfumed cherry, and plant them all 9 feet apart. That will be 537 trees to the acre, and they will fruit freely in about one-fourth the time required for the stocks usually employed.

The lay of the land is the best possible shelter, and in purchasing land care should be taken that it is in a somewhat sheltered position. A few osage oranges, planted like a hedge, would be of some service if the orchardist had time to prune them two or three times during the growing season; but unless this could be done they would be useless. I would also plant plums, pears, or apples in the more exposed portions of the orchard if the soil and climate were suitable for them. Some trees, such as apricots, do not require much shelter. Again, although the young trees may be all the better for shelter, what would be the use of planting young trees for shelter at the same time as the young fruit-trees are planted; for the shelter-trees would require just as much attention as the others. If pines are planted for shelter they must be placed at a distance of not less than 60 feet from the fruit-trees; and it can easily be seen that this would occupy a large proportion of the area; and if planted at a less distance they would ruin the crops of fruit, and even kill the trees. If an orchardist had a large area of land, a belt of gum-trees about 4 chains distant on the weather side, with another belt of some variety of trees suited to the locality, midway between the gums and fruit trees, would be of some advantage. It is very hard to shelter trees on high land, and no one would ever think of planting rows of shelter-trees across his orchard at short intervals, which would be the only effective means of shelter.

Digitized by Google

Fruit-trees are rendered temporarily unproductive, and even killed, by being allowed to ripen too large a crop of fruit, or, as it is called, to overbear themselves. The thinning of fruit is consequently one of the most important operations in the orchard, though one of the least generally practised. In vines, nectarines, peaches, apricots, apples, and pears, thinning is essential, and it should be done with a fearless hand; for the perfection of the fruit allowed to remain will amply reward the grower in harvest-time for the apparent sacrifice made. Half the fruit, or in some cases even more than that, should be taken off, and in such a manner that those left will be evenly distributed all over the tree.

Trees should be pruned hard back at planting time; and it is a good plan to go round two or three times during the growing season and rub off all superfluous growths and ill-placed shoots. If the summer pruning is attended to early, this can be done with very little trouble. In pruning all naked and crossing branches should be cut out, while one-half of the lateral branches should be cut out alternately at their points—especially in peach-trees. Apricots should be spurred—the old spurs cut out here and there, and room left for new ones. There is not time enough to go into the whole question of pruning, but I would like to impress upon the orchardists the necessity of keeping the trees moderately thin from the first, so that there never will be occasion to amputate large branches. Most of the pruning should be done in the summer time, as it is far better for the trees, and the work can be performed in one-half the time.

I have not had much experience in orange culture in this Colony. In the old country this fruit is generally grown in tubs under glass, and I never noticed an orange so grown, going wrong at the neck and dying. This, it is stated, is due to the stocks used, but for these the London nurserymen use citrons, shaddocks, lemons, or any of the imported varieties of oranges. The rotting, as it is called, I think, is caused by insects and fungi. However, it is well worthy of investigation, and I would advise all orange-growers to give their opinions and experiences of it to the Department of Agriculture.

The PRESIDENT, on the Conference reassembling in the evening, and before calling upon the delegates to resume their labours, announced that a fine collection of apples had been received from the orchard of Mr. Paterson, of Tamworth, for exhibition, and also a sample of currants from Mr. Willis, of Corowa. He said: No better illustration can be given of the advantage of obtaining information upon agricultural matters than is afforded by this latter sample. Mr. Willis informs me that a few other gentlemen in the same district are also growing currants, not for commercial purposes at present, but merely as an experiment; and he feels certain that in a short time they will be able to produce them with profit to themselves, and advantage to the country generally. The currants, so far as I can judge, are very good; their flavour is excellent. The next subject we have to deal with is "Planting of new orchards and vineyards." You must all admit the importance of this question, because, to a very large extent, upon the successful planting of orchards and vineyards depends the success of fruit-growing and wine-making in this country. In the past too little attention has been given to it. I have no doubt that some of those who have already laid out orchards and vineyards would be glad if they had never done so, for they have discovered they have planted the wrong class of vines and fruit-trees; they see they have the wrong aspect,

Digitized by Google

and that the land is altogether unsuited for their special requirements. It would be better for those gentlemen to root up their trees, and to inaugurate a new system, than to continue upon the present unsatisfactory lines. The papers which are about to be read to you, and the information which will be conveyed through them, will, I trust, be of great benefit to the people of the country, who may reap from them the fruit of your experience. We have met together for this very purpose, and I believe the Government will assist you in every possible and legitimate way. Our object, as a Conference, is to ascertain whether the system of cultivation pursued in one district will be suitable for others. For example, take the two magnificent districts in the north. We can grow there any kind of fruit, from the pineapple on the coast in the Richmond River district, to the hardy gooseberry on the tablelands; all that we require is the knowledge to enable us to do so. Only the other day we received a letter from a gentleman in the district whence came these apples. He appealed to the department in what I thought a very pitiful way. He said there are a number of vignerons in Tamworth who have planted from 6 to 8 acres with vines, and having done so they were in a quandary as to the next course to pursue. They began to fear that they had not selected the most suitable plants, and they appealed to the department for information to help them out of their difficulty. In a *Gazette*, which will be published in a few days, you will find advice, based on the best available results of experiments made in this and the adjoining colonies, which will, I think, be of inestimable advantage to you, and to gentlemen similarly situated to those at Tamworth. I mention this in order to show that the department is alive to the country's needs, and all that is required in return is the sympathy and assistance of the producers. We wish to obtain your experiences so as to instruct others who may wish to embark in the same calling. It is good of you who have been successful, in many instances in spite of heavy odds, to come here, and to give us the result of your practical experience. You have taken a most liberal view and a most unselfish course. We have no need to fear competition in this Colony. We can face the world. Being successful, we shall gain and retain the trade of the old country. We only need to produce the best varieties of fruit, and to export them with proper treatment to ensure this result. A Californian gentleman told me the other day in the House of the wonderful strides which they have made recently with the orangeries of that country. But a few years ago most of the orchards were threatened with destruction; in fact a large number were destroyed by the cottony cashion scale (*Icerya Purchasi*) and it was only when they imported a number of our ladybirds (*Vedalia cardinalis*) that the insect which had done this damage was eradicated. We must follow that example here. I can again assure you that the Government will do all that lies in their power to further your interests. They are satisfied that there is a great future before the vine and fruit-growing industries. The knowledge which is essential to their development will be obtained and circulated by the Agricultural College and Experimental Farms which we propose to establish. Specialists have already been appointed, whose duty it will be to investigate the various diseases common to fruit trees, and also to analyse and experiment upon the soils. The results of their work will be communicated to inquirers in due course. As an instance, a gentleman at Glen Innes forwarded to the department specimens of potatoes and peach-trees for examination, and there was discovered for the first time a worm which has committed great ravages in America and Germany. This worm was not known to exist in this Colony until Dr. Cobb conducted these experiments. I mention this to show the great danger we

Digitized by Google

run from not knowing the pests which devastate our crops, and the necessity of these tests in order to arrest their further development.

Mr. Stiemr, Fairfield, said that with regard to manuring he did not altogether agree with Mr. Whitaker, who had advocated deep manuring for vines. While he disagreed with Mr. Whitaker in this respect, he endorsed everything that gentleman had said with regard to wine-making grapes. These did not want too rich a soil; a reddish soil, on a high situation, and intermixed with gravel or shale, was the best. Mr. M'William, in his paper, had spoken of 12-inch trenching as being all that was required in the Corowa district, and, judging from the description he had given of the soil, no doubt that was quite sufficient. While this might answer with deep-soil localities, it certainly would not do for others, and any grower who adopted such a system would find it a failure in less than two years. With respect to draining, some growers argued that hilly land did not require it. This, in his experience, was unsound. He believed it to be necessary to drain not only hillsides but also the lower land, where frequently the trees suffered most from the heavy rains. The system he adopted was to make a drain every 40 feet. If the trees were planted 20 feet apart, between every second row, he placed a drain 3 feet 6 inches or 4 feet deep, running at any angle across the hill. By this means all the rain was collected, and soakage was prevented. In a drain 50 chains long the pipes should not be less than 2 inches wide. In draining a slope he would use the herring-bone system of drainage. Personally, he did not approve of the system of laying pipes straight down the hill in parallel lines, because he believed by so doing only the ground immediately adjoining was properly drained. The main object of draining should be to carry off all the surplus water, and this was, he thought, best achieved by the plan he suggested. He did not agree with those who said that draining exhausted all the moisture from the ground. The reverse, he thought, was the case. A proper system of drainage preserved the subsoil moisture. In his opinion, nearly all land should be drained. Only by doing this could they hope to overcome the chief obstacles to successful cultivation.

Mr. J. Purser, Seven Hills, said he had never practised anything but surface drainage, and from long experience he found it answer admirably on land with a shaly subsoil, and of a porous nature. His custom was to place a drain a foot or 15 inches deep between every two rows of trees. In preparing the ground he plough-trenched it 10 inches or a foot deep, six months before planting. Next, he harrowed it well several times, and then he staked it out for trees 20 feet apart. Where he intended planting the trees he ploughed the ground to a depth of 12 inches, and placed therein the various manures required; and every two or three weeks, for a period of several months, he worked the soil near the stakes. He was particularly careful in planting orange-trees to see that the root fibres were well placed all round. He did not believe in mudding them, as practised by some growers. He was equally particular in placing the soil round the trees, and in securing them to the stakes. While the trees were young he had the ground round them continually ploughed and harrowed, and this process was persevered in until they were three or four years old, without disturbing their roots. The trees were closely pruned, and all the dead shoots were at once cut out, for this, he found, preserved not only the green wood but the fruit. In draining land, he believed it was necessary where the soil was of a heavy nature to have recourse to underground drains, but in a soft loamy soil, such as his, surface-draining was all that was required. His trees were as carefully selected as the soil in which he planted them. They were nearly all raised by himself, and from very old stock. With apples, lemons, and stone fruits, pruning

Digitized by Google

was both carefully and regularly done, and he had never known a crop to fail. Mulching, he found in his experience, to be of great value. Green leaves allowed to decay formed the best mulching; they should not be placed too thickly round the trees, nor should they remain on the surface too long, but be worked well into the ground. With regard to the preservation of fruit, he mentioned that he had been able to keep mandarins until March. The best sites for orangeries were those with a north-east or north-west aspect, with undulating loamy soil. In such a situation, and having the best class of trees, fruit should be very successfully cultivated. The fault with many growers was in considering quantity before quality. The matters he had referred to required attention, and if they were followed out he felt sure the fruit industry would rapidly develop all over the Colony.

Mr. P. F. Adams, Liverpool, said he did not altogether agree with what Mr. Whitaker had said about the suitability of the county of Cumberland for grape-growing. He did not think it so good as many known and unknown districts, and it was to the latter that the attention of the Agricultural Department should be directed. He thought we had in this Colony the elements of a wonderful future for vine-growing. This prosperity, he thought, would not be confined to any single vineyard or locality, but the great trade, as he anticipated it, would result from the blending of the different vintages for shipment. The soil best adapted for viniculture is that derived from decomposed granitic rock, and especially that kind which contained a friable felspar, readily affected by the atmosphere. This rock existed in many parts of the Colony. Different opinions had been expressed by Mr. Whitaker and Mr. M'William as to the manner in which grapes should be planted, and nothing could be more diverse than the system of trenching and draining practised in the county of Cumberland, and that of Corowa. He accounted for the ease with which the vine was grown at Corowa by the enormous quantity of potash and lime which the soil contained. Every constituent requisite for the perfect cultivation of the grape was found there. Too much stress, he thought, could not be laid upon the necessity for testing the soils of those districts, at present little known, in order to ascertain their capabilities. Climate had as much to do with the cultivation of wine and grapes as had the soil, and he would advise that the investigation be extended to this influence. Experiments should be conducted in those parts of the Colony from which they had expectation, and the first thing to be done was to ascertain the minimum temperature at night, at the time of the budding and shooting of the vine, so that they might judge whether the country was subject to late frosts. It was these late frosts which were the bane of many districts which would otherwise produce excellent fruit. The next thing was to ascertain the time when the grapes coloured, and the date at which the fruit dried up and shrivelled, and fell rotten from the vine. This information would guide them in their decisions as to the worth of the new country. The longer the period that elapsed between the colouring of the grape and the vintage, and the longer the period from the formation of the fruit to its colouring and ripening, the greater would be the opportunity for the juices to form first malic and tartaric acids, and then sugar. If the time extended into the autumn the winemaker had so much longer time to work in. In the coastal districts the time between the ripening and falling of the fruit was so short that the grower was compelled to make the wine when he could. Wines from any district, so long as they were carefully made, had their value for mixing and blending purposes. If they were not well made the sooner they were destroyed the better. With reference to draining, upon which several opinions had been

Digitized by Google

expressed, he found the best method was to make one drain with 2-inch pipes in the direction of the fall of the ground, with branches on either side, composed of inch and a half pipes every 20 or 30 feet, as the nature of the soil might indicate. This 2-inch pipe should drain into an arterial pipe, which would carry off all the water. They should, of course, reckon the size of the pipe by what it had to carry. He quite agreed with the gentleman who had advocated wide-distance plantings for vines. He had laid out his rows of vines so that, if necessary, he could plant intermediate rows. Mr. Wright's paper contained a capital explanation of how soil was drained, and it entirely agreed with his experience. He also approved of what that gentleman had read as to pruning and thinning crops. He was disappointed that no reference had been made to root-pruning, for this subject was one he was anxious to learn something about. He quite agreed with what had been said by Mr. Purser in respect to staking the trees. In doing this he usually used strips of leather, or what was better still, on the grounds of economy, the strips of sail-maker's canvas. A strip of the canvas could be wrapped round the stem a couple of times and fastened to the stake. Then, no matter how the wind might blow, the young trees could not get chafed. The establishment of experimental farms, as had been suggested, would be of great value, and the benefit would be enhanced if the students were allowed to gain experience in the different schools.

Mr. BRIDLE, Tumut, said: The formation of the soil in the Tumut district was such that it did not require any artificial drainage. The subsoil was loose, and did not hold water, and so the natural drainage was perfect. He had done a good deal of root-pruning in his orchard. Owing to the loamy formation the tendency of the tap roots was to grow straight down, and of the branches to grow upwards. To prevent this he had to place a number of stones in the soil. They might cut the top branches as much as they liked, but unless they pruned the tap roots the suckers would still grow high. He had root-pruned the greater part of his trees with much advantage.

Mr. F. H. G. ROGERS, Castle Hill, commenting upon Mr. Wright's assertion that he did not believe in the planting of shelter-trees, said it was possible in his district to keep oranges from February to March, and this because the trees were sheltered. The *Pinus insignis*, Mr. Wright had told them, would ruin orchards if it was planted within 60 feet of them. He recommended the cutting of a trench 18 feet from the trees, and 2 feet deep, to prevent the roots of the pines from encroaching on the orchard.

Mr. WILLIS, Corowa, said that, considering the heavy expense to which the growers of Central Cumberland were put, he could not see how they could successfully compete with those who had not to resort to such artificial aid to production. It would be much better for them to go into the Riverina, where there were thousands of acres as level as could be, that simply required ploughing. The land he held was only ploughed 6 inches deep, and it had been producing good crops for the last sixteen years. Speaking of the cultivation of the Zante currant, a sample of which the President had called their attention to, he stated that, to grow them perfectly, they should be trained on a trellis, or over a roof. The process of drying he had adopted was very simple. The fruit ripened very early; it should be picked before fully ripe, and then dried on sheets of corrugated iron, in the sun. All that was required afterwards was to dry them and put them through a winnowing machine; they were then ready for market. He believed these currants could be grown with great profit and advantage.

Digitized by Google

Mr. Scobie, M.L.A., West Maitland, said that on most of the soils in the county of Cumberland draining was requisite for success. If there was a retentive subsoil, unless it was well attended to, failure would most likely result, especially with trees of the peach variety. These stocks were much more liable to decay than any other variety of fruit. It might be news to some of them that the grape-vine would stand more water than most trees. He had had a good opportunity of studying this. A portion of his land skirted a lagoon, and this year the river had been so long in flood, just at the time the grapes were ripe, that many of the vines were submerged for three or four weeks. Very few were injured. Had the flood happened in the winter no harm at all would have resulted. He would not advise the usage of timber in making drains, because it rotted away quickly, and allowed the soil to be washed away. Open drains, too, were not economical. His experience was that such drains fostered the growth of weeds, which could not be readily destroyed. It was much cheaper to put in pipes in the first instance; 2-inch pipes he found answered best. A difference of opinion was expressed as to the direction which drains should take on the fall of a hill. His practice was to place them straight down a hill, and between each row of trees. If the ground was examined after dry weather it would be seen that the cracks ran in a straight line across the ground, and when the rains came those cracks caught the water, and conveyed it into the drain which carried it away. In the planting of young orchards it was the opinion of some people that but a small variety of trees should be introduced. In his opinion it was desirable to have several sorts, which would fruit one after the other, and sometimes it was necessary to select an inferior kind, because of the season at which it bore. It might ripen when no other variety was ready, and thus it would be better than no fruit at all. Something had been said about shelter-trees. While they had their advantages they had their disadvantages. Frequently the shelter-trees deprived the fruit-trees of their nourishment. To prevent this, Mr. Rogers suggested that a trench should be cut. That might answer to some extent, but the roots would be constantly spreading over. Another great drawback to shelter-trees was that they harboured birds and other pests, which did great damage to the fruit. One gentleman had spoken against the county of Cumberland as a grape-growing district, but it had a great advantage over most distant localities, in being closely adjacent to the market.

The discussion was postponed, and the Conference adjourned, at 10·40 p.m., till 10 a.m. on Tuesday.

Mr. J. D. Lankester, Albury, said he wished to say a few words upon the question of planting. In the Murray country the vines had been planted very close together, but after an experience of twenty-five years it was found that close planting did not answer, and now in most of the vineyards the trees were either being altogether uprooted, or every alternate row removed; and, instead of having the vines 4 feet or 5 feet apart, they were planting them in squares of 8 feet. The system advocated by Mr. Whitaker had been tried, and found to be too expensive. In his orchards the vines were planted in squares, and he found that less labour was needed to work them. He had removed up to the present some 10,000 vines, where they were planted too closely, and with great advantage. The Shiraz grapes had been reduced to the size of currants, but with the change they had developed to the proportions of olives. By having the rows 8 feet apart, the sun was better able to get at the vines, and better facilities were afforded for cultivation. Manures were little used in the Albury district; where they were used they were dug well into the soil. In dry climates the best thing the vignerons

Digitized by Google

could do was to work the soil thoroughly in the summer-time, for then it was always ready to receive and absorb moisture. If the ground was allowed to get hard, the rain, when it came, simply drained away from the surface. With regard to what had been said of pruning, he might mention that with some varieties of vines long pruning answered best—as, for instance, the Verdeilho—while Reisling, Black Shiraz, and similar varieties were usually pruned short. It had not been found necessary to plant trees for shelter, as they were too far away from the coast, and no high winds prevailed. Where there were trees they were only a nuisance, as they only harboured birds. He quite agreed with what Mr. Adams had said as to the characteristics of soil. In his district it was impossible to grow light thin wines; the soil was too rich. Black spot had been mentioned as a disease attacking the grapes. He believed that it arose from a want of proper draining, for the disease only appeared in wet seasons. During a comparatively wet season black spot attacked the Muscatel and other varieties of table grapes, but it did not affect the ordinary varieties of wine grapes.

Mr. A. E. Davis, Allandale, confirmed what had been remarked by the previous speaker as to the distance at which vines should be planted. In the Hunter River districts some of the old vineyards were planted 6 ft. x 6 ft., but all the new ones were laid out 8 ft. x 8 ft. or 10 ft., and in some instances even more than that. The result of this alteration was an improvement in the fruit grown.

Mr. R. Pulver, Wagga Wagga, said that when he first came to Victoria, now nearly thirty-six years ago, wine-growing was in its youth. He obtained a small parcel of land on a ten years' lease, and commenced to plant vines in the Continental fashion. It was not very long before he found that this system would not act, and he made a fresh beginning. He ploughed the soil, which was of a sandy nature, with a shale and clay bottom, to the depth of a foot or 16 inches, pulverising it thoroughly, and then harrowing it. The vines, when the soil had been properly prepared, he planted in squares 8 ft. x 8 ft., carefully staking the trees with unsharpened sticks, thus saving labour; and this system he found to answer admirably. He believed in working the land thoroughly, but he did not approve of subsoiling. Each year, after planting the vine, he took care to keep the ground porous with a small plough and scarifier, and he also took care to protect and shelter the trees as much as possible from the great heat of the sun. The method of pruning illustrated by Mr. Stieme was the one he practised. If there was a superfluity of buds he cut them off, and the result was that he obtained fruit of both size and quality.

Mr. Purser, Seven Hills, laid stress upon the necessity of exercising care when selecting a position for a new orchard, and in the choice of the trees to be planted. He produced samples of oranges grown from trees the wood of which was fifty-two years old, and which were raised from layers of still older trees. The fruit was free from disease, and kept well on the trees, and this he attributed to the constant pruning and draining of the orchard.

Mr. A. Lansdowne, Goulburn, said that, through not being present on the first day of the Conference, he was unaware of what had been read upon the subject of planting new orchards and vineyards. He, however, wished to make one or two observations. Of vineyards he knew very little, but he had had considerable experience in the planting of orchards. Generally speaking, fruit-trees were found to grow best when they were 20 or 30 feet apart. They must have sufficient light and air. Some growers make a mistake when pruning, in allowing too much sunshine to reach the tree. In

Digitized by Google

the Goulburn district, where the westerly winds were very strong at times, they had to keep fruit-trees low; and this system possessed the additional advantages of enabling them to save both time and labour when gathering the fruit, and of protecting the fruit from the birds; but it was found inconvenient for ploughing, as the limbs were rather in the way. The disadvantage was slight as compared with the advantages which they reaped from having the trees low, and it could be obviated by using some hand instrument where it was not possible to take a plough. It had been found of good service to plant shelter-trees on all exposed situations, for not only were they subject to severe storms, but to continuous westerly winds, which destroyed the whole of the crops. In reference to cultivation, he believed in keeping the soil moist and loose, at the same time taking care not to disturb the surface roots. If the surface was kept too much disturbed there was the danger of touching the roots, and thus causing blight; but, on the other hand, pruning the surface roots sometimes induced bearing. It was found necessary to resort to mulching in the summer-time. Whatever the mulch consisted of, it should be laid close, but not too close round the tree, and the soil was kept moist and cool. When the ground had been cleared, the best thing to do was to sub-soil plough to a depth of 15 inches. Many people made the mistake of planting too deeply. Vines should never be placed in holes; it was much better to plant them shallow, and work the ground well. In deciding the distance at which the trees should be planted, the question to be considered was the nurture they required. Some persons wished to grow fruit, yet starved the trees; they forgot that plants required food just as much as human beings. If they did not feed the fruit-trees they could not expect any return. It was necessary to find out the manure the soil required, and then supply it. The more life and air they could give the better the trees would grow. He was glad to be present at the Conference, for he believed such a gathering would expand their ideas, and enable them to introduce a better system of fruit-growing, and thus advance the industry in this Colony.

Mr. F. A. Bucholtz, Mudgee, said he could not see where the benefit was of planting shelter-trees round orchards. If there was a strong wind it must pass through the trees, and strike the orchard in some places more than in others. The best method of trenching in the Mudgee district was found by experience to be that done with a heavy horse plough. From 15 to 18 inches deep was quite sufficient in a soil well suited for grape cultivation. He believed in the systems of pruning demonstrated by Mr. Purser and by Mr. Stieme. It was a great mistake to allow the trees to get too high; they should be kept well back, so that the fruiting would be as near the stem as possible. Mr. Whitaker had mentioned the black Shiraz as a good grape to grow, though liable to burst. If excessive rains came at a critical period, this variety was easily destroyed. As to mulching, it was found most useful, for it kept the roots cool in the summer, and it also acted as a manure when decayed. The soil near Mudgee had one good feature, and that was the presence of a large quantity of potash, and this, he believed, accounted for the excellence of the fruit grown in the district.

Mr. T. Grunsell, Goulburn, said that although the Goulburn district was not suitable for vine-growing, he had succeeded in cultivating a large number of vines, and he was credited with producing good fruit. He had been taught by experience, that it was a mistake to plant vines too closely together. When first he laid out his vineyard he placed the trees 5 feet apart, but he had since found the distance insufficient. He kept his vines closely pruned, saving much labour in the summer-time. Some time ago *oïdium* made its

Digitized by Google

appearance among the vines. The disease was never known before, and he experienced a difficulty in finding a specific; and he was at great expense to make the trees bear again. What he did was to get a hand-saw, and cut off the tops of the vines, leaving little more than the roots; then he went round the district and collected scions from trees free from disease, and grafted them on the stumps remaining in his orchard. He applied sulphur to the newly-grafted vines, and in the course of time they began to bear fruit. Some of the scions turned out well, others badly, and each year he had rooted up those of little value, and planted in their places a better class of vine. Along each row of trees he placed a simple trellis of young saplings, which afforded a hold for the young shoots, and also acted as a shelter. With other fruits he did not prune so closely, as he believed in having large trees.

Mr. C. A. Jackes, Armidale, said that some of the speakers had advocated an eastern or northern aspect for young orchards. In the New England district it was necessary to have a western or a southern aspect. After clearing the ground for a young orchard they generally put in a crop of corn or potatoes, which had the effect of pulverising the soil. In the following year the ground was ploughed and rolled, and then the trees were planted 20 feet apart, and at a shallow depth. Three or 4 inches was found quite deep enough, and never a foot, as had been mentioned by one speaker.

Mr. W. Relton, Armidale, gave his experience of orchard-planting on the Blue Mountains, at a spot between Katoomba and Medlow. He had about 10 acres of ground, and he resorted to this class of agriculture to occupy himself, being of an active turn of mind. In the first year he cleared the land and ploughed it three times, not too deeply. After ploughing he staked out the land in squares of 20 and 22 feet, and then dug the holes for the trees, and allowed them to remain open until he planted. The soil was very poor indeed. When he planted the trees he took care to put the good soil at the bottom of the holes to a depth of about 6 inches. He placed the trees on the top, and then filled in with other good soil. He kept the trees pruned down to a height of about 3 feet, and left three eyes, which ultimately gave him three branches, and he continued this course for five years. The result was he had an abundance of superior fruit, which was found mainly in the heart of the tree. He was less troubled with sun than growers nearer Sydney, and his aspect was just the reverse. Heavy winds prevailed occasionally, but he had never known them to destroy the trees. The varieties which did remarkably well were principally English.

The President called upon those gentlemen who had read papers to make their replies.

Mr. Whitaker, Parramatta, said that in his experience vines which were planted at a distance of 12 or 13 feet apart produced the finest fruit. The best vines, he found, were the Black Hambro, but they needed to be closely pruned and well manured, or they would go back. In pruning, the different varieties required different treatment. It was impossible to treat every kind alike. To those who said that trenching was unnecessary he would reply by recommending them to take a piece of land adjoining that which had been ploughed, and properly trench and drain it to a depth of 4 or 5 feet. The result of this experiment, he believed, would show that 5 acres of land so treated were better than 10 acres which had been simply ploughed—at least, that was his experience. It was exemplified in Camden Park. With regard to shelter-trees, Mr. Rogers had stated that a deep trench would effectually prevent the pine-tree roots from encroaching upon the orchard. At his place there was a row of stone pines, and he found that their roots grew into the vine roots, and

Digitized by Google

thus injured them. He had a drain cut 2 feet deep, and then found that the pine roots grew down below this level, and still entered the vineyard. It was necessary for his district to have shelter-trees. The subject of light had been mentioned. In his opinion we had too much light for the proper cultivation of orange-trees. It was also proved that trees with a northern exposure were injured by hot winds. With regard to what Mr. Adams had said about volcanic and granitic soils, experience showed that these were best suited for the cultivation of the grape.

Mr. STIMSON, Fairfield, said that he did not quite agree with those gentlemen who had advocated a system of free transit as the best method of developing the fruit-growing industry. Such a system, he thought, would be hardly fair to the growers in Central Cumberland, seeing the expense to which they had been put. A great deal had been said, and rightly so, about draining. It was a most important question. Without drainage their orchards would soon be destroyed. Soils which least required draining would be all the better for attention in this direction. The pipes he preferred to use were either 2-inch or 3-inch, and the best way to lay them was across the angle of the hill, and not straight down, as Mr. Scobie had advocated.

Mr. M'WILLIAM, Corowa, said that some misunderstanding seemed to have arisen as to the depth to which the land was trenched at Corowa. He had stated that 12 inches was quite sufficient, and he based his statement upon experience. He had cultivated over 80 acres of vines, and all he did in cultivation was to plough the soil well, and keep it loose. Of course he did not advise this system for every locality, but, since experience had shown it to be the best for his district, it was advisable to continue that method. A rich chocolate soil and a sandy loam he found best for grape-growing, and he adopted it.

This closed the discussion.

Digitized by Google

Wine-making—Its prospects, and the best means of advancing the industry.

THE PRESIDENT: We now proceed to discuss this subject. I am quite sure that those gentlemen who have promised to read papers will afford us much valuable information upon this great industry. It is a great industry, and bids fair to become one of the most important in the Colony. At the present time, I regret to say, we import much wine and export little. The fact is well known that on many occasions our wines have taken the lead in the home markets, and it is a matter for surprise that so little interest has been taken in fostering its growth. We possess a favourable climate and suitable soils, and all that is necessary to ensure the success of the industry is proper cultivation. So far too little attention has been paid to tree selection, suitable soil, and situation. This is shown by the remarks of a delegate from Tamworth. The wrong class of vine had been planted by some growers, and when this was discovered the department was consulted as to what should be done in the future. Those gentlemen should have ascertained what was best to be done before they laid out their vineyards. It has been stated that the best class of vines are too expensive; but what, I would ask, is the use of planting varieties unsuitable to the district? With ground properly prepared, the initial expense of good vines would soon be recouped. I trust the papers about to be read to you will afford information which will be of advantage, not only to those who have already embarked in the industry but also to those who contemplate entering upon it. The gentlemen who are about to contribute papers are authorities on the subject of discussion, and their opinions will be most valuable to the department and to the country.

Directions for Fining Wine, and Bottling it for private use.

P. F. ADAMS, Liverpool.

I AM privileged in having to read a paper on the fining of wine; but there is not much to be said upon this subject which would be interesting to any but those about to engage in wine-growing, and who know but little of the business. I propose, therefore, to make that subject secondary, giving preference to one on which I have several times been asked to write, *viz.*, *plain directions for the guidance of consumers of Australian wine, who wish to deal direct with the grower and bottle it for their own use.* This appears to be the practice in the wine *growing* parts of Europe; but in those countries every one is, by early associations, familiar with the treatment of wine; yet I have never seen a published treatise on the subject. The prevailing ignorance here is very much to be regretted, because it precludes many persons from the

Digitized by Google

wholesome enjoyment of good wine, having the alternatives of beer or spirits, both of which are unsuitable to the climate of Australia. At the cost of one shilling a bottle the consumer can have a first-class wine, and the grower secures an equally satisfactory return for his outlay. It would also give an impetus to the production of good wine.

The intending purchaser of a cask of wine for home use should first collect a sufficient number of bottles (six to the gallon) of clear glass, so that impurities on the inner surface may be readily detected; also suitable wine-corks from a wholesale druggist. As much of his success as a bottler will depend upon the care and cleanliness with which the operation is conducted, the bottles must be his first care. These should be soaked for a day in water containing a little soda or potash, and brushed inside with a bottle brush, special care being taken to clear out the cavity round the bottom. Avoid the use of shot, which are put by some people into bottles and shaken up with the water. Bottles cannot be properly cleaned in this way, as shot does not reach what it is most necessary to remove. When the bottles are washed they should be stood upright in a rack erected in a sunny spot in the open air. When drained and dry inside the bottles should be inspected in the full light of the sun, where any impurity invisible when the bottle is wet inside will now be readily detected. It is also necessary that the bottle be clean outside, which will follow easily in the process of washing, because impurities on the outside may be confused with those inside, and *vice versâ*. In examining the bottles, pass back all that are not clean for further treatment, and keep the rest in the rack, neck down, till required.

The appliances required in bottling are—bottling-tap, cork squeezer, small mallet, wooden punch (smaller than the neck of the bottle) a few long cedar bungs, which may be had from any cooper who does business with wine-growers, and, in the absence of a valench, a piece of glass tube, 20 inches long, and $\frac{3}{8}$ inch in diameter, will do. Only the first four articles need be obtained at first, for if all goes well the rest will not be wanted.

Now, we will suppose that the expected cask has been delivered at the residence of the consumer, who is cautioned and advised to exercise patience, and on no account rush incontinently for gimlet and peg, and draw first a sample, then a bottle, forgetting that by so doing he will let air into the cask and with it germs of fermentation and decomposition, which unseen float about ready to germinate in any fluid susceptible of their influence. To this light and delicate wines are no exception. Let him content himself with removing the covering from both bung and tap hole, measure both and see that he has the right size of both tap and long bung.

Then set the cask up on a solid stand (bricks will do), about 18 inches high, so that plenty of room is afforded for filling the bottles, taking care to have the tap end of the cask outward, and some 2 inches lower than the other end. See that the bung is upwards and chocks fixed to prevent the cask from rolling and thereby disturbing sediment.

It does not follow that the wine must repose in a cellar—any part of the house will do if the temperature is fairly equable—but, of course, a cellar is the best. Once set up, the cask should never be disturbed till the wine is in the bottles, and as soon as empty a piece of sulphur match (made by passing a strip of calico rag through melted sulphur) should be burned in it, the cask being then corked and bunged tight. As long as the fume of sulphur remains no germ of impurity will affect the cask, which should be at once returned to the wine-grower, who will be glad to allow full value if it has been carefully attended to. After this digression we return to our

Digitized by Google

cask, which should rest quietly for a week or ten days, or such period as may be directed by the vendor, in order that it may recover from the effects of the journey. No sampling must be done meantime; it would only lead to disappointment to the purchaser and injustice to the vendor. The former would not recognise the clear crisp wine he had admired in the cool cellar at the time he made his selection, and would, in all probability, imagine that the grower had substituted an inferior article for the wine he had chosen. He may be assured that many weeks must elapse before the wine will recover from what is termed "sickness," caused by the shaking and change of temperature it has undergone. On the other hand, he may be consoled by the fact that, if he bottles successfully, in three months the bottled wine will be better than that remaining in the cask. This is another digression; but I hope that my hearers will remember that the cask was allowed a week at least to recover its journey, at the end of which time it is to be tapped.

If the tap-hole is stopped with a cork, pick away the outside of the cork with a knife, apply the tap and see that it will fit. If so, wrap it round with a strip of thin wet rag, give a smart blow with the mallet or billet of wood; the cork is forced in, and the tap takes its place without losing any wine. If the wine does not flow without air gurgling up the tap, bore a small gimlet hole near the bung, and insert a peg. Draw from the tap about half a tumbler, and then catch a sample in a wine-glass; and if it is clear when held between the eye and a candle held in a place which would otherwise be dark, the wine is in condition, and the sooner it is into the bottle and corked up the better. Once started, let nothing stay proceedings till the last drop is out of the cask.

After the wine ceases to run from the tap, carefully tilt up the back end of the cask, and continue to draw till no more will run; then knock out the tap; catch the rest and bottle it also. Keep all these bottles separate, cork with slight hand pressure, stand them on end, and in a few days decant off the clear wine, which will be almost as good as the rest.

Should there have been no tap-hole, or one that was unsuitable, a new hole should be bored carefully with a centre-bit, till the wine begins to exude from the orifice. Then proceed as before, for the thin wood remaining will splinter off before the driven-in tap.

If it is unavoidably necessary to stop bottling during the process, by all means burn a small piece of sulphur match, hooked on a piece of wire, over the wine in the cask, and, leaving the fumes in the cask, bung lightly but firmly.

The process of corking need scarcely be described. The corks should be steamed and drained, each cork being squeezed in the *cork-press* to exclude moisture before driving. Some persons dip the cork in wine to facilitate driving. In cases where the mouth of the bottle will be found too small to take a whole cork, it is open to cut the cork in half, and drive the half cork to its proper position with the wooden punch. The bottles corked with half corks may be set aside for early use. After corking, the bottles should be piled away on their sides, and on no account should they be allowed to stand on end, even for a week; the cork may dry and shrink and admit air.

In ordering a cask, I often request the grower to add a fining of Spanish earth before sending away; but I would not advise that this be done contrary to the advice of the grower, who is responsible for the condition of the wine.

Digitized by Google

I am aware that exception is taken by some to the use of Spanish earth, on the ground that it flattens the taste of the wine. After long experience I have never perceived this effect. I think that the sceptic would be convinced by putting the full quantity required to fine a hogshead into a bottle. Then fill up, and after a day or two taste the clear wine from the top.

If boiled and properly prepared, scarcely any taste is perceptible even in this concentrated form. I also believe that the pure earth is absolutely insoluble in wine. There may be some impure samples about, but I have found none.

I cannot too strongly impress and repeat my caution against admission of air to the cask or uncorked bottles. The air of cellars especially is charged with the germs of fermentation and decomposition, which are, however, destroyed by the fumes of burning sulphur (sulphurous acid gas), although the gas may be so attenuated and dispersed as to be perceptible to the organ of smell only.

Wines containing nearly the maximum amount of natural alcohol—say, equal to 25 per cent. of proof spirit—have greater power of resisting the development of germs, and may be exposed many days or several weeks without being spoiled; whereas as many hours would injure a light delicate wine of (say) 18 per cent. proof spirit.

Unless the purchaser is a really good judge of wines, I would advise him only to deal with a grower of known experience, &c., who would, for his own credit, see that only wine of mature age and in suitable condition for bottling was supplied.

I had intended to describe the treatment which I would recommend in case the wine supplied failed to become clear enough to bottle, but it would exceed the limits of a paper for the present occasion.

I may, however, explain the use of the glass tube advised to be obtained. It is to enable a sample to be drawn from different depths below the bung of the cask. The long bungs are to be used for replacing the flat one. A long bung can be easily removed by simply tapping lightly on the sides till it comes out.

If it should appear that the cloudiness observed in drawing off the first sample is caused only by local disturbance, and that the rest of the cask is clear, then only the first few bottles will be affected, and the bottling may proceed.

Acting carefully upon these directions, no difficulty should be experienced in successfully bottling a cask of sound mature wine; but if, on the contrary, after a delay of eighteen or twenty days from the setting up of the cask, upon drawing a sample (after a quart had been run off), the wine is found to be still muddy and unfit to bottle, it would be better to return the cask after pouring back the sample by the tap-hole. If the cask of wine is not returned, at least one should write to the vendor for advice, and he will probably be glad to get the wine back again.

I had proposed to describe the process to be followed in the event of not being able to return the cask, and having to make the best of a bad bargain, but the limit of time will not permit this.

I now come to the subject of fining wine, and how to prepare the finings for use. I advise the amateur bottler, notwithstanding the prejudice against Spanish earth, previously mentioned, to make use of it. If it does not fine the wine, in consequence of existing disturbances, it will do no harm; whilst, on the other hand, albuminous fining failing from the same cause will only partly deposit, leaving the remainder in suspension to the prejudice of the wine.

Digitized by Google

Several preparations are sold by wholesale druggists for fining (some of which are largely used), besides sulphuring mixtures. Both are easily applied, and are accompanied by full directions for use; but as I have had no personal experience of any of them, I do not discuss their merits.

The three best known finings are white of egg, isinglass, and Spanish earth. The first has the merit of being easily obtained; with regard to the second, I advise the employment of the best brands, although I have had excellent results from a kind of fish-glue which comes from the Mediterranean, and is I understand used on the Continent of Europe. Spanish earth is sold by wholesale druggists.

For white and for the more delicate red wines, white of egg is generally employed, using from two to four to the quarter cask (of 28 gallons), according to the strength, colour, and age of the wine. Young, strong, and dark wines require the maximum quantity—older and paler wines the lesser. Egg fining has also the advantage of being easier in preparation. All that is required is to separate and reject the yolks, whisk the whites till they begin to froth, add wine by degrees, stopping the whisking if too much froth appears. After several applications of the whisking process, gradually increasing the dilution till about half-a-gallon of the mixture is attained. The fining may be added to the cask.

In the preparation of egg-fining, no better vessel need be desired than an ordinary ewer and basin.

Isinglass fining requires more manipulation, and for each 30 gallons to be fined, it is desirable to use a clear glass bottle, holding at least half-a-gallon. These are called by druggists, "Winchester quarts." If the bottle has a wide mouth, capable of admitting a bung, so much the better.

The quantity of isinglass to be used varies for the same reasons, as when the egg finings are used. From 5 to 10 grains for each gallon is the usual quantity; but I have used as much as 20 grains in reducing the astringency of a coarse wine almost black in colour.

The druggist from whom the isinglass is obtained will weigh out the quantity required, which should be put to soak in a suitable vessel—a salt jar with a bung, for instance. Let it stand till it has swolled to its full extent—perhaps, eight or ten hours; then drain off the water and fill the jars with wine; cover and place the vessel in a warm place—say, a temperature of 140 degrees—shaking it occasionally, and keeping it carefully covered.

When it appears that no further dissolution will take place, the whole may be transferred to the "Winchester quart," and filled about three-quarters full with wine. Shake up frequently, keeping it in the same warm place. After a few hours, no further dissolution will take place. The bottle may be filled and shaken, and is then ready for use.

Spanish earth-fining, like all others, depends for its success on the fine state of division to which it can be reduced. A single ounce, in a perfect state of division, would fine a hogshead, but in ordinary practice, four or five times that quantity is used.

I advise breaking up the quantity to be used roughly, boiling it in water to destroy any germs which may be collected in it—then allowing it to stand until settled. Drain the clear water from the top; rub the residue in a mortar, if available; if not, tie it up in a piece of strong calico, and beat it well till it is disintegrated, saving all that comes through the cloth. Then strain or squeeze through muslin or open calico; put into a ewer, and well whisk, increasing the quantity till as full as it can be conveniently. It is then ready for the cask.

Digitized by Google

Whatever kind of finings may be used, the same process of incorporating it with the wine should be employed. A clean stick, long enough to reach the bottom of the cask, should be provided, but never used a second time.

Start stirring with the stick always in the same direction, till a circular motion of the wine in the cask is obtained; then pour in the fining quickly, and commence stirring in the opposite direction. By this method the finings are thoroughly disseminated through the wine, which may now be bunged down.

Albuminous fining takes from two to three weeks to deposit; Spanish earth, from five to six days.

In trade it is absolutely necessary that bottled wine be free from deposit or cloudiness. Although the wine may be bright and clear when drawn off albuminous fining, it is quite possible that it contains germs of disturbance which may develop after the wine is bottled. Wine, apparently in good order, often shows, by the candle test, minute filaments floating about. I am not aware what these are, and failed to get them under microscopic observation, but I believe that they are in some way connected with germs of fermentation.

In dealing with light white wines I usually racked, after the albuminous fining, into a well-sulphured cask and fined with Spanish earth. As soon as the sulphur flavour had left I bottled. Wine so treated was found to contain no filaments, and kept without deposit. I have also, with very light wines, rinsed the bottles with sulphured water, to destroy any germs that may have collected inside the bottle.

Judging from the flavour and *condition* of many cheap imported hock wines, I judge that this practice is adopted in Europe, or some other process by which the same effect is produced.

Before closing, I may add a few words upon the action of finings and sulphur fumes upon wine.

Albuminous fining, in a state of minute division, is acted upon by the astringent principle (tannic and gallic acid principally) and by the alcohol. The effect is to change the character of the albumen from soluble to insoluble. More or less, when finely distributed, the action of the astringent principle hardens, and causes the albumen to shrink and catch impurities held in suspension, and finally deposit them at the bottom of the cask. In the case of Spanish earth the action is purely mechanical, and less searching than the albuminous fining. It being but little heavier than the wine, falls gradually to the bottom, taking with it most, if not all, the impurities.

The effect of burning sulphur is to produce a gas,* which has an affinity for oxygen, without which the germs of decomposition cannot exist. The wine absorbs a certain quantity of the gas, which in its turn attracts the free oxygen held in the wine, and forms another product. This deprives the germs of oxygen, and they consequently die. The effect is only transient, and if the cask is not kept carefully closed the wine will take up fresh air and fresh germs, and in a short time will require sulphuring again. There is one consolation however—that is, the results of the combustion of sulphur are perfectly harmless to the human subject, even if a hundred times the quantity possible to take in wine were absorbed. As an instance, an empty cask, after having been sulphured every month from one season till the next, when washed out before filling, the water will be found to have no perceptible taste, or show any other manifestations of sulphur.

* Sulphurous acid gas.

Digitized by Google

How to make Agricultural Shows one of the best means of Improving Wine-making.

DR. FIASCHI, Sydney and Richmond.

THE aims of wine exhibitions in our colony should be threefold: First, competition, by means of which the best of the various wines of a certain class and age are adjudged and declared. Second, education, to point out to vine-growers at large by what particular merits the prized wines have attained success, and in what respects the unsuccessful exhibits have been found wanting. By so doing defects will be remedied in the future, and the number of perfect wines will be yearly increased. Third, record; the secretary of each jury should publish a report of the organolectic and chemical analyses of the exhibited wines. Such a document would assist all those who seek information as regards the character of wines of different localities, and of the various vintages for the same locality. To us in Australia, young in the art of wine-making, such information would be of the greatest value, for it would enable intending vine-growers to select the most suitable localities as regards climate and soils for the class of wine that they purpose making. As yet a pure wine exhibition has not been held in the colony, but many of our agricultural associations have wine sections in their shows. It is far from my intention to criticise the doings of such sections; I feel rather disposed to give them praise; for considering the yet small dimensions of the New South Wales vineyards, they have proportionately expended on wine a large amount of money and intelligence. I must say, however, that of the three aims above mentioned they have attained only the adjudgment of prizes. Such aim, of the greatest value from a commercial point of view, sinks far below the other two as regards usefulness to the vinegrowers at large, and to the wine industry as a national enterprise. With very little effort on the part of the management of the associations these three aims could all be obtained, if the means that I am going to suggest are carried out. To start on a good foundation it would be advisable for these associations to make sure that they have good judges in wine matter. Such men are scarce, and for that reason it would be as well to have only a small number of them. Three good judges will return more reliable verdicts than five incompetent or interested ones. On no account should the judges be wine merchants,—importers of foreign wines. I doubt their fitness, because their minds and palates are prejudiced, and as a general rule, accustomed as they are to deal with the ripe article, they are altogether in the dark as regards the life history of wines. If a defect is present in a wine, due to some faulty manipulation in the early preparation of it, most of them would not be able to account for the cause of it, much less to suggest how to prevent it. The appointing of judges is so difficult a matter that, now we have an Agricultural Department, it would be better if the agricultural associations left such a delicate choice to Government. Furthermore, having got the suitable men, Government ought to provide them with a set of wisely-framed rules, so that they may have a fixed criterion to go by in the adjudgment of each class of wine. As to the educational aim, how is that obtained in the European wine-producing countries? Wine exhibitions there have almost the character of wine fairs. Each exhibitor takes good care to have a small stall where he is provided with numbers of bottles of the same kinds of wine that he has exhibited, and these he freely allows all visitors to sample. These exhibitions are extremely popular, and always command a large attendance of vine-growers and of the

Digitized by Google

public. The former come thus in contact with each other, and have opportunities of tasting and comparing all the wines entered in the show, whilst yet *sub judice*, to discuss amongst themselves the characters of them, and gain information as to the manner in which they were obtained. I do not expect such a practice to be introduced here just now, but I would suggest that on judging day all exhibiting vine-growers should be allowed to be present during the sampling of the wines by the jury, and should at the end of it have the opportunity of tasting for themselves, and comparing the various exhibits. In making such a proposition I have present to my mind the saying of Franck, "that a wine judge should be deaf and dumb: deaf, so as not to be distracted by noises in the determination of merits and faults that his sight, smell, and taste reveal to him; dumb, to avoid the expression of a hasty judgment or an inconsiderate word." Vine-growers as yet are in too small a number in this colony to form a crowd at any such judgment capable of distracting the judges. Nor do I fear the objection, that by allowing the exhibitors to be present at the judgment, collusion might be possible between some of the exhibitors and some of the judges. If the system of having the wines judged with the bottles under cover is properly carried out by the stewards, neither judges nor exhibitors know who the wine belongs to until the judgment is pronounced. Vine-growers would derive too good a lesson by watching the jury in the fulfilment of their duty to allow any similar objections to be in the way of such a practice. Coming now to the third aim, record,—so far as my knowledge goes no complete analytical report of wines exhibited at any of the agricultural shows has ever been published. The only such reports of wines of this colony that I have been able to find are those that were obtained at international exhibitions, notably the Bordeaux Exhibition of 1882. From the Vienna Exhibition of 1873 and the Paris of 1889 Victoria and South Australia reaped honours and reports; but our wines, through the unpardonable error of our Government, were not represented. Few and far between as these records are, they are milestones on the progress road of our wine industry; had they been more numerous we would now be much further on. No wine show should ever be allowed to pass without having a record of the character of the wines examined written and published. This record should include the organolectic* and the chemical essays. The first should note colour, odour, taste, limpidity, and character of froth. The second should at the least contain the specific gravity, the percentage of alcohol—in weight and in volume—the per thousand of acidity, of saccharine matter, of tannin, of bitartrate of potassium, of dry extract, and the colouring intensity as compared to a standard solution of acetate of rosamline, by means of the colorimeter. By so doing you fix the characters of the wine; you obtain, as it were, a photograph of it that will remain, and will, to all time, be of use to the students of œnology. The chemical part of this analysis, as soon as our agricultural school be sufficiently developed, should be done by the professor of œnochemistry. By carrying out these suggestions, agricultural shows will confer a lasting benefit, not only to those amongst vine-growers who are always on the watch for knowledge and ready to improve their produce, but will also excite the attention of the niggardly, and where four exhibitors enter their name now they would be counted by scores. It is not three or four grand wines that will raise our national reputation as wine-makers, but the general goodness of all the wine produced. By frequent and well-conducted shows such an end will be obtained, and the day will not be far distant when wine judges will find it extremely difficult amongst many excellent wines to pick out the best.

* Capable of being judged by the senses—sight, taste, and smell.

Digitized by Google

On Wine-making, and how to advance that Industry in New South Wales.

H. E. BONNARD, Vitis Park, near Richmond.

WHEREVER the vine (*vitis vinifera*) has been found to grow, it has, beyond any doubt, proved to be the industrial plant from which the country derived the greatest benefit, by being the most wealth-producing, the most health-giving, and the one which employs and settles the greatest number of people and industries with, perhaps, the less output of capital.

That wine-making is well adapted to the soil and climate of New South Wales there ought to be no doubt whatever, after over half a century of trials and experiments, such as those which are well known to have been made. The seasons are not worse than those of Southern Europe, and all the varieties of soil required can easily be found.

Yet, from the official statistics of the colony, the industry has so little progressed that even now it may be looked upon as stationary, and its prospects should certainly be a great deal better than to all appearances they are. Few of those colonists who have gone for it have done particularly well out of it. The general public has some peculiar prejudices if not hostile feelings towards Colonial wines; capitalists and financial institutions show very limited faith in Colonial vineyards; very few colonists now-a-days will venture in it, on the ground that it requires several years to wait for returns beyond the necessary special knowledge, and hardly one merchant, if any, can be found in Sydney to act on any scale as intermediate between the producers and the consumers, most growers having to retail their wines themselves; finally, recent legislation and official action have gone a long way to jeopardise the credit and development of that industry.

There is no doubt that at first, owing to wine-making not being a British industry, those spirited Britishers who first started it here had to do it without either theory or practice, of what is nothing short of an art. Some of them even asked people from the North of Europe to show them the secrets of what is essentially a southern art; subsequently they had to rely upon whatever theoretical knowledge alone they could get for themselves, and it is only within the last few years that our growers possess both theory and practice such as, by joint action, can lead them towards progress.

In the meantime, Colonial people begin to find out that strong spirituous drinks are not intended for this climate, that light drinks are far better, whilst temperance drinks fail to give to many constitutions the strengthening and lubricating powers which are required by many men in many circumstances. As a matter of fact, the time cannot be far distant when our people will demand our wines in substitution and preference to all other drinks. It is likely enough, however, that the present generation of colonists will not take much to wine-drinking, as tastes do not change very suddenly; nevertheless, those viticultors who have done their best to produce wines strong enough to please customers in the past, will have to modify their views, practice, and experience, and, perhaps, replant their vineyards, so as to prepare themselves for the tastes of the coming generation.

Besides, and even in preference to Colonial markets of the present day, there is an immense supply to provide for—by producing wines such as are required all over Europe; indeed, there is no limit to such production, and there will be no such limit for several generations, as anyone really acquainted with European requirements can easily testify to, whilst New South Wales alone is almost large enough to produce more than enough

Digitized by Google

wine to supply a fair share of the world, if not the whole of it, so far, at least, as plain, sound, ordinary wine is required. The main points to consider being, whether Colonial capital has the necessary spirit and patriotism to back the industry, and whether the new generation of Australian-born colonists has the willingness and inclination to take to agriculture as a profession, the most healthful, most useful, and most noble employment of man. Now, to satisfy both Colonial and European tastes, which is not so difficult a matter after all, I believe and respectfully submit that the whole question can be settled as follows:

1st. Colonial vineyards should be planted exclusively in light alluvial, sandy, gravelly soils, within the middle or southern coastal districts, within easy reach of a port of shipment, as near as possible to a large centre of population, and to railway facilities, or means of water carriage. It is well known that, to a certain extent, the poorer the soil the better the wine, and the longer will the vines live, although the smaller the quantity of wine obtained may be; while the richer the soil the larger is the quantity of wine to be expected, but the vines will be shorter lived and the quality of the wine less likely to suit and please consumers, or to be appreciated by properly educated wine-drinkers, as our wealthy and leading people must soon be, by travelling and mixing as much as they have taken to do among European people. Light soils of alluvial flats, or gravelly hills will, as a rule, produce wines of not more than 12 per cent. of alcohol, and as low as 8 or 9 per cent., which are the limits of good, even superior ordinary dinner-wines; any wine above these limits is hardly fit to drink, even with water, as wine should be drunk. At the same time, if such strongly spirited wines as 15 per cent. and more are to be obtained from New South Wales soil, such wines will readily find a market of their own for what is known as operating purposes.

Further, vines planted in very light and sandy soil will last at least 50 or 60 years, and be much easier to cultivate and attend to, kept free from many pests, and especially from the Phylloxera, which is absolutely known to keep away from sandy soils, so much so that, wherever possible, all new European vineyards are planted in sandy soil containing as much as 70 per cent. of sand.

For the present our growers should depend upon no other vines than those belonging to the Asiatic or European kinds, and as long as possible, if not for ever, abstain from resorting to American species, however resisting these may be to any insect or disease. Although, for all that, the time may come when they may have to employ these, but if planters will confine themselves to plant in sandy soils, they are very unlikely to require American stocks.

2nd. As many viticultors of each district as are within reasonable distance of each other, and without sufficient capital to have a proper cellar and implements of their own, and to give the necessary time and attention to their produce, should co-operate for the building and management of such a cellar, at a common expense, by some truly competent wine-cooper, even if such had to be imported; such manager to possess a knowledge of both theory and practice, and to be able to keep proper and detailed records of the daily workings in the cellar.

3rd. Colonial viticultors of the present period should confine themselves to the production of only one or two kinds of wine, and those, especially red, in preference to white, for as a rule these last are more difficult to bring to perfection, and are less in demand for exportation. Every grower should endeavour to secure a special repute for the thus limited production

Digitized by Google

of his distinct vineyard. A great mistake made in the past, even by men considered as leading vine-growers and wine-makers here, has been to attempt the production of claret, burgundy, sherry, hock, port, etc., etc., within the same few acres of a small vineyard worked by the same vignerons, the consumers unfortunately believing that such production could take place, and subsequently condemning all Colonial wines as so many frauds.

By thus limiting themselves to one kind, growers could produce more of it, and be able to supply consumers for a much longer time than they do now with any of their sorts.

The growers of the various districts should also abstain from dealing themselves direct with the public, but should combine to find out, and assist by all reasonable means, a few gentlemen of social standing and repute, with average ability of the kind required, and in need of some mercantile occupation, to act as brokers and introduce the different wines to the general public. Such a system would prove cheaper and more profitable to vine-growers than having to keep shops of their own, whilst the position of wine-broker is in no way despised or considered as *infra dig.* by leading citizens of such cities as Bordeaux and Paris, to whom many European growers are greatly indebted for useful and practical advice as to the management of their vineyards or cellars.

4th. The Government and the Legislature may and should act as advisers and observers, provide scientific information of an official, thoroughly reliable, nature, and even, in very few exceptional cases, financially help those growers who first help themselves against drawbacks, pests, or evils of all kinds. But Government should in no case interfere in a direct manner, or assume any initiative from which might result financial responsibility, moral discredit, or scientific defeat; thus carefully leaving the growers to act singly, or to co-operate together, choose the various people and ways they may think, from official or other information, the most likely to do successfully any particular work they may have to do, and generally look for themselves after their own private interests, which they should naturally have enough at heart to advance, serve, and protect, independently of any official supervision or direction—the forced character of which is, in itself alone, always very distasteful and objectionable to intelligent and self-relying men.

5th. The most absolute free trade should prevail with respect to foreign and intercolonial wines, the present highly prohibitory tariff on imported wines having been, to my mind, one of the main causes of delay—one of the principal obstacles—to the development of a taste and demand for wine, and to the progress of the Colonial wine-making industry. I found from official statistics that the revenue from imported still wines at the present time is hardly larger than it was 25 years ago, when the duty was only 2s. per gallon instead of 5s., and the population of the colony considerably less than it is to-day.

My argument is, that if people here could have secured light wines, imported or Colonial, at a reasonable figure, they would have taken to them, as they have done and still do to beer—especially light beer. By degrees Colonial people would have got used to drink light wines, as the English people are now getting to prefer them to port wines. Our Colonial growers instead of going, as so many have done, for the production of strongly spirited drinks, would have taken to produce wines as light and similar as possible to those imported; and in due course, with the help of the climatic influences upon health and tastes, and the production getting smaller every year as it now does in Europe, and larger in the colony, wine-drinkers would by degrees have come to give preference to Colonial wines.

Digitized by Google

If a fourth of what is paid away every year by New South Wales for taxes upon tea, spirits, and beers was spent in Colonial wines, the wine-making industry would soon go ahead, just as well as that of the brewers. As it is, too many Colonial wine-growers rely upon the Government charging a fine of 100 per cent. against imported wines, and trust to the misguided taste of a certain proportion of the population to produce strong and unfinished wines; hence the hostility to those at home and abroad. Even now, although they may send these wines to Europe with an absolute certainty to sell them at a paying rate, they have to be first adapted to European requirements, and in that adaptation they lose their Australian names.

Let the consumers be free to choose the kind of wines they prefer by not fining them for doing so, and let it be known that Colonial growers do not attempt to produce the high-class or many wines of Europe, but confine themselves to one kind of sound, ordinary, light refreshing wine, always the same, or very nearly so, and no dearer than imported wines, as may well be done. The freights, insurance, interest upon these, as well as the doubts surrounding their genuine nature, will soon prove too much for them to compete against Colonial produce.

Every man, woman, and child in New South Wales would drink Colonial wine instead of tea; drunkenness and intemperance would disappear, and civilisation progress; whilst our wine-making industry would then soon prove itself to be what it should be, the main agricultural industry of New South Wales.

Wine-making, its Prospects, and the best means of advancing the Industry.

J. D. LANKESTER, Ettamogah.

No. 1.—Wine Making.

In writing a few notes on wine making, I do not pretend to lay down any hard and fast rule, as the vignerons in each district must from local causes modify the work to suit the peculiar circumstances of climate, soil, &c.

1.—*General Rules.*

I would point out the necessity of the utmost cleanliness, and it must be borne in mind that no vessel of any kind that is used for wine or wine making should be used for any other purpose.

Immediately the vintage is completed, casks for carrying grapes, vats, grape mills, presses, and every utensil should be carefully cleansed, and, when dry, washed with a saturated solution of lime. The lime-water is made by putting quicklime into water so that the water may be fully charged with lime, and when settled, the clear water poured off and used for the purpose of preserving all the vessels sweet for the following year. The cellars in which wine is kept should not contain any dairy produce, vegetables, or in fact anything that has sufficient odour to be noticeable, or any matter that is liable to ferment.

Permanent stands for casks must be built solid on stone or brick foundations, so that no wood comes in contact with the earth; cellar walls should often be white-washed with lime, and the floors of all cellars which cannot be washed down should be freely sprinkled with lime; casks when empty must be at once cleaned, and, as soon as they are dry, charged with sulphurous acid gas by burning sulphur in them.

Digitized by Google

During vintage every vat, press, &c., used must be cleaned before refilling.

The grape contains every element that is necessary for the manufacture of good wine: saccharine, tannin, the fermentive principle, water, &c. It is not necessary to use any of the drugs, essences, or poisons that are constantly pressed upon vignerons as being essential in the making of good wine; these things are only required by people who do not take care of their wine in a proper manner, and who use their wine vessels for water or kitchen use, look after everything on their property first, or seek their own pleasure, and leave the wine until any spare time or wet day. Those who wish to succeed in wine making must make the wine their first study, and, if necessary, work night and day to keep it in order, leaving everything else to be attended to after.

In the Hunter River district the vintage is commenced in February, and the wine is all comparatively light; the heat there at that time is great and the fermentation goes on rapidly, so the wine is often ready to rack in five or six weeks.

On the Murray, where the vintage takes place at the end of March and in April, although the days are warm the nights are cool, and the fermentation is more gradual, the wine is rich, and is often unfit to rack before June. I may here remark that wine once spoilt, either by acetic fermentation or otherwise, can by no process be renovated and made really good, equal to what it should have been if properly made and kept, any more than a piece of rotten wood by a coat of paint can be made sound.

Many people submit their wine to different kinds of treatment suggested by wine doctors, who use deleterious ingredients to kill the acid and renovate the wine; such wine is never wholesome, nor will it have any beneficial effect on the consumer.

When racking wine, either with the pump or by hand, the proper plan is to tap the cask within 3 inches of the bottom (and not use a syphon), and if the casks are large use a screw-jack at the back to tilt or lift the back so as to run all the clear wine off the lees.

New wine should, if possible, be put into casks with doors or manholes at the bottom of the front head, so that a person can go inside them and scrub thoroughly.

Wine will mature quicker in small casks, but the loss by evaporation and in racking is greater, and the wine is not of so uniform a character as when larger casks are used, and the cellar work is greatly increased by the use of small casks.

None of the rich wines of the Murray district are fit for use until the third year, and should not be bottled before the fourth year; some are better kept even longer in wood. I frequently keep wine to a much greater age before bottling.

Grapes to make wine develop its full flavour and bouquet should be quite ripe, and should show a specific gravity of 1·120 at the least, that is $\frac{120}{1000}$ heavier than water; for sweet wines such as Aucarôt or Muscat a much higher density is required. The white wines are made by passing the grapes through rollers, which should be arranged so that the crushed grapes, stalks, and juice pass by gravitation into the presses; do not use a machine to remove the stems as the pulp will not press so well without them; do not hurry the pressing; it is impossible to squeeze juice *out* as fast as the presses can be screwed down, and contact with the stalk and skin is necessary to impart tannin to the wine, without which wine will not clarify.

Digitized by Google

The white wine is passed by gravitation or pumping at once from the presses into the casks, which can only be filled to about three-fourths of their capacity. Whatever sized cask is used, only use it for the wine pressed in one day (24 hours); if not sufficient to fill it leave it ullaged, the violent fermentation will be over in a few days; no covering is necessary as long as there is a continuous discharge of carbonic acid gas, which is generated by the decomposition of the sugar or vinous fermentation; as soon as that ceases to be continuous, cover the bung-hole with sand bags, or even a piece of cloth and a stone or bung placed on it for a week or two until it is safe to bung the cask, even then the long bungs or plugs used should be removed occasionally to ascertain that there is no undue pressure of gas; some fill the casks quite full at this time; I do not.

With red wine the process is somewhat different; as the colour is in the skin of the grape it is necessary to ferment for a day or two according to the colour required; the temperature will often control the fermentation. If the fermentation does not commence quickly, crush a few grapes of another variety and thoroughly incorporate them; do not let the vats stand where they are subject to the cold air of night.

Before the black grapes or muscatels are passed through the rollers the stems must be removed by machine or grating, as the heat of fermentation would extract too much tannin or bitterness; sufficient is attained by the fermentation on the skins.

When the tumultuous fermentation is over the wine should be racked off into casks, which must be quite filled; the skins are then put into the press and the must or juice extracted.

My reason for adopting the foregoing style was from having noticed in visiting different vineyards the want of cleanliness and system, and having found quantities of wine spoilt by those causes and want of attention. In a late number of the *Cumberland Argus* I read a letter, in which it was stated that much of the Australian wine was so uncertain in quality that the sale was much affected thereby; the bottling having been badly performed—bad corks, dirty bottles, &c.

2.—*The prospects of the Wine Industry.*

I will not trouble you with statistics, but merely remark that a large proportion of the wine that is exported from France is first imported into that country from Turkey, Greece, Italy, Spain, and other parts of Europe; it is doctored and blended, and then exported as French wine. France also imports immense quantities of dried grapes or raisins, from which, with the addition of water, spirits, and essences, wine is made for export.

In New South Wales we have unlimited areas suitable for the growth of grapes, and there is at present a large demand for good wine at prices much higher than can be obtained for similar wine in Europe.

The growth of the Australian wine trade has been very slow. The reasons are—(first) the want of the education of the people to use wine as a daily beverage, and as a necessary part of each day's food, being conducive to health and temperance; (secondly) the length of time capitalists have to wait for interest, as after land is purchased the clearing has to be performed in a very perfect manner, as most of land requires trenching not less than 20 inches deep. After cuttings are planted two and a half years must elapse before the first crop is gathered, and one more before a full crop may be expected. If the grapes are made into wine by the vigneron, an expensive plant is necessary—cellars, casks, vats, presses, &c.; then from one to five years more, waiting for cash returns. Few people

Digitized by Google

with capital will embark in this industry, and many of those having knowledge lack sufficient capital to wait for so long a period for returns, and banks will not advance money on wine, being perishable, and requiring technical knowledge and constant watchfulness to keep in order. Notwithstanding these things the wine industry is gradually progressing.

Grapes for raisins and for table use will give a quicker return, and should be planted more extensively. During the past year several of the weekly papers have published articles on raisin-making as practised in California and South Australia.

3.—*The best means of advancing the Industry.*

I would begin by instructing or educating the young people in the art of wine-making, as well as in the working of the vineyards, by means of lecturers and Viticultural Colleges; analysing all wines that are offered for consumption, more especially imported wines, to ascertain their purity, and destroying all impure and deleterious wines.

To be a thorough vigneron, and to be an expert in maturing and bottling wines for market, requires some scientific knowledge, as well as a long apprenticeship and training. I have devoted upwards of thirty years to study and practice of wine-making, bottling, &c., still I find much to learn as new discoveries are made.

Perhaps I may be allowed to suggest to the department to obtain, if it has not done so, from San Francisco, copies of the works published by authority of the State Government, such as the "Reports of the Chief Viticultural Officer," as well as a file of the *San Francisco Merchant*, &c., from which quite a fund of information may be gathered.

I am writing a series of articles for the *Australian Vigneron and Fruit-growers' Journal*, a new monthly paper, and intend to touch upon bottling, &c., as well as on timber for casks and vats. One reason of the difficulty of largely increasing the sale of wines is that large quantities of new wines are forced into the market, and sold to dealers who bottle them and send them to customers as if they were good matured wines; this creates a prejudice against Australian wines not easily overcome.

The restriction to the sale of wine by growers is also a great drawback to the wine industry, and also tends to the demoralisation of the people, as many small growers habitually avoid the law. By allowing wine-makers to sell small quantities of wine, the publican's interest would not suffer in the least, as weary travellers now are frequently supplied free by those who respect the law, although they are liable to be summoned to the police court for that act of kindness.

Wine-making for Exportation; Soil and Climate suitable in New South Wales.

L. FRERE, Thurgoona, near Albury.

THE task of vignerons or fruit-growers is an arduous one. The farmer can sow and reap in a few months; the squatter when he has stocked his station will get his wool and lambs some months after; but the vigneron has to wait years and years until his vines bear fruit, and some more years again until his wine is fit for sale. Experience is consequently more wanted in that industry than in any other, because if one make a mistake it is only long afterwards that one can recognise it, and it will take years again to

Digitized by Google

repair it. Wine-making is an easy task in the old world, where every step and every process is the outcome of the experience of centuries, and the vigneron has only to contend against the inclemencies of the seasons and the natural enemies of the vine. Here everything is new. We have not as a guide the experience of our ancestors; we are our own forefathers; we have a great deal to learn, but very little to teach; and it is by conferences like this, by placing in common the result of our observations, that we will build a solid step whereon to place in safety our hesitating foot. The creation of viticultural colleges is a most happy idea which will bring excellent results; and, I say it again, our gratitude is due to the Minister who has taken the initiative of those measures, and to the Parliament who will give him the means to carry them out. Vine-growing has not reached that stage of development in New South Wales up to the present that it has in Victoria and in South Australia. Our wine production is, I believe, equal only to our own consumption; the vignerons seem to have adopted the treatment of their wines to suit the taste of the people, since it is all consumed amongst us; but we have thousands and thousands of acres fit for viticulture lying idle. Our climate is eminently favourable to the production of grapes, and, like our neighbours, we mean to make use of these natural advantages. If we increase our vineyards we must know how to get rid of our surplus wine. We have to look for that outlet towards countries where the vine does not grow, and where, however, good and sound wine is in great favour. England will naturally be our principal buyer if we can produce a wine that will suit her taste. The wines which are sweet, strong, and even fortified have still a strong footing amongst many; but we see the majority drifting towards the dry and light wines of the claret type—and my remarks will apply only to a wine of that character. Do we produce such a wine in New South Wales? Not to my knowledge. Can we produce it? I believe we can. We must not think that the wines sent over the world as claret are the produce of single vineyards or of single districts. There are certainly exceptions. The Grands Crus of France are sold without blending, but those are scarce and precious jewels, which resemble nothing else, and which no one can imitate. The great majority of clarets are the result of blends and of wines generally grown at long distances from one another. It is a wine of a good colour, without being too dark; generous without being too strong; astringent without being bitter; fresh and agreeable to the palate; and quenching the thirst. Its bouquet is not the least part of its merit, and it rejoices the senses at the same time with its taste and smell. Our wines of the Murray have not by themselves the characteristics of a real claret. When dry and well fermented they have many of its qualities, but not all. They have a fine colour and good bouquet. We can get in them as much tannin as we want, but they are too rich, too generous, and have not the freshness that we want for our type. They will be a powerful auxiliary for its creation, but they are not it by themselves. It is not in my power to speak with so much knowledge of the wines of the Hunter. No one admires them more than I do, but they are not clarets. They are excellent Hunter River wines, just as our wines are excellent Murray wines. When those two wines are blended judiciously they are in many cases a great improvement on either separate. A firm, which is an honour to the trade—the Messrs. Lindeman—have recognised this fact long ago, and have combined the growing of wines on the Hunter and on the Murray. What was deficient in the blend of those wines I have had the opportunity of tasting was a want of freshness to the palate. Something which you feel, but which it is not easy to describe; something of the

Digitized by Google

exhilarating quality of champagne, without being sparkling; and yet not completely that. To grow the wine necessary to complete a good blend we must go to the hills, to a climate moister and cooler than both that of the Murray and the Hunter; we must look for a soil sandy and stony. We have nearly all of us looked for the plantation of our vineyards on the richest of our soils. We have thought that as a rich land produces strong healthy vines and abundance of grapes, it would also give the best of wines. Well I firmly believe we would have all improved our qualities if we had not been attracted only by the richest soil. The wine most resembling claret that I have ever tasted in this Colony is a wine which was grown near the Parramatta River, at Hunter's Hill, on a patch of sandy soil surrounded by rocks. There are around Sydney thousands and thousands of acres of similar ground, *e.g.*, near Campbelltown on the heights of the George's River; and it is my firm belief that in years to come this will be a great centre of viticulture. We must not forget that the vine is one of the hardiest of plants, and that the soil will always be rich enough for it, if the climate is suitable. The finest wines of Europe are almost invariably grown on sandy or rocky hills. In some parts of Burgundy so steep are the hills, so thin is the surface soil, that men have to carry up on their backs during the dry months the soil which has been washed away by the winter rains. There are, I am sure, many places which will have the same, and perhaps more, advantages than the heights of George's River, but I speak of those because I know them. We find there light sandy soils with underground of stone and clay. Enormous trees testify to the vegetative power of the soil; the climate is mild, the heat of summer is tempered by a constant breeze from the sea, and an abundant dew refreshes the plants during the night. In the case of dry summers the George's River and the creeks adjoining it can be transformed into immense natural reservoirs at very little expense, and we will have there enormous volumes of water, suitable for irrigation at any time of the year. Those grounds have been considered as a useless part of country, fit only to feed a few wallabies, and a favourite haunt for wild dogs. With a little Government help—that is, in the making of roads to facilitate access to the hills and the damming of the river—those abandoned hills will be in a few years transformed into beautiful orchards and magnificent vineyards. If 20,000 or 30,000 acres of vines were planted around Sydney we might see loafers and beggars in the street, but we should certainly not see any *bona fide* unemployed, as there would be work for every one amongst the vineyards. I do not pretend that the type of claret that we are looking for will come all ready from the vineyards of the Cumberland county. The wines will only be part of the blend; and the vineyards of the Murray and the Hunter would naturally increase in the same proportion. An export trade in wine cannot be carried on successfully by isolated vine-growers. The quality will vary almost with every vintage in a vineyard; and when one sample of wine will bring a second order of an identical quality, the vigneron in most cases will be unable to execute the order. By blending on a large scale, or sooner by blending wines of different characters and of different and far-apart districts, the quality of the blend will be every year almost identical. There will be nearly every year a compensation—the wine of a district will be poorer one season and richer the following, and *vice versa*. The art of blending cannot be taught or described by writings; the only guide is the palate. The blend will not be later on what it is when it is made, consequently a long experience and a perfect knowledge of the qualities of wine to be mixed together are necessary, and only time and experiments will instruct the operator. It will be evident to anyone familiar

Digitized by Google

with wine-making that the same rules will not apply to sweet liqueurish wines and to wines of the claret type. On the Murray we can have, almost at will, a wine sweet or dry. It is simply a matter of picking the grapes sooner or later; and our climate is generally so dry, so equable at the time of the vintage, that nearly every year the grapes may be left on the vines till they are perfect raisins. The specific gravity is extremely high, and we have seen examples of must so concentrated, so rich in sugar, that it could hardly ferment, and remained a perfect syrup. We shall be able there to choose our time. If we wish to make a wine suitable for blendings of the type which is the object of this paper, we will have to pick the grapes when the specific gravity is between 1,090 and 1,100. That will be ripe enough—we do not want them over-ripe; and when well fermented the wine will contain from 12 to 14 per cent. of absolute alcohol. It is quite enough for our purpose, and sufficient to ensure the conservation of the wine and the development of its bouquet. The fermentation of the must with the skins will have also to be longer than if we wished to have a sweet wine. In a claret we want tannin, which will give solidity to the wine and also a little astringency, which is one of its qualities. Well, tannin exists only in the skins, the husks, or the seed of the grape. It is very little soluble in water, but on the contrary very soluble in alcohol; and it will be necessary to give our must time to produce alcohol to get the tannin required. One or two days would not be sufficient for that purpose; it will require from three to four days, according to circumstances. We must not be afraid if the wine is a little bitter at the start, the finings will easily get rid of that. At home a little bitterness in a young wine is never objected to; it is, on the contrary, rather cultivated. We will have then to ascertain how the wines of the different parts of the Colony will blend together, and in what proportions. That task will be greatly facilitated if, as I hope it will, the Government decides to establish viticultural colleges; one of them being on the Murray, another on the Hunter, a third in the county of Cumberland. They could every year try the blend of these different wines at the last college, which would be central; and, besides, every vigneron who wished to see experiments carried out could send a quarter-cask or a keg of wine. And then, without risk, without expense, the experiments could be conducted on the lines indicated by experts delegated by the Government or elected by the vignerons themselves.

Alcoholic Strength of Australian Wines.

From Notes furnished by P. E. FALLON.

The late Mr. J. T. Fallon, in a paper read in December, 1873, before the Society of Arts, London, on "Australian Vines and Wines," speaking of their natural alcoholic strength, said that grapes had been grown in his vineyard returning over 30 per cent. proof spirit, which Dr. Thudichum would scarcely believe, as no wine had up to that been known to return more than 26 per cent. without artificial fortification. This was a very important question, as on wine beyond the range of 26 per cent. there was an increased duty of 2s. 6d. per gallon, and up to that strength they were imported at 1s. per gallon duty.

In the discussion which ensued, in which returned colonists and other gentlemen interested in Australia took part, Mr. Fallon effectually controverted Dr. Thudichum's theory, showing that proved facts sometimes override dogmas of theory. The correctness of his view was also confirmed by

Digitized by Google

Dr. Bleasdale (a scientific gentleman of high attainments, and a great authority on Australian wines) from an analysis made by himself. Mr. Fallon subsequently in June, 1876, read a paper before the Royal Colonial Institute, London, on the "Wines of Australia," when the discussion was renewed. In the report of Mr. Fallon's paper on "Australian Vines and Wines," there is embodied a statement from Mr. J. Cosmo Newberry, analytical chemist of the Technical Museum, Melbourne, regarding samples of Mr. Fallon's wines submitted to him, in which he says, "There were no traces of adulteration"; and from tests made with Saleroni's still and Sykes' hydrometer the highest reading is from Carbaret, which contained 30·6 per cent. of proof spirit.

On Mr. Fallon's return to the Colony he communicated with the authorities in New South Wales and Victoria on the question of officially testing the strength of Australian wines, who thereupon appointed the Chief Inspector of Distilleries of each Colony to obtain samples of grapes, and conduct technical examinations, in order to ascertain beyond doubt the special strength of pure Australian wines. The officers of both Governments, Mr. Leslie A. Moody, Chief Inspector of Distilleries, Victoria, with Mr. Heath, Assistant Inspector, and Mr. H. A. Lumsdaine, Chief Inspector of Distilleries, New South Wales, met by appointment in Albury, and collected fruit from the principal vineyards in the district, which was afterwards operated upon, and found to contain a percentage of proof spirit much higher than it had hitherto been supposed would develop naturally; and in a report by Mr. Lumsdaine (appearing in Mr. Fallon's pamphlet on the "Wines of Australia") on the wine made from grape must all the samples were shown to contain a much higher percentage than 26 per cent. of proof spirit. The highest of these was from the Pineau grape, showing 32·4 per cent., and Muscat came next, giving 31·6 per cent. proof spirit. In consequence of the representations made by Mr. Fallon, supported by the reports of these gentlemen, the Imperial Government admitted Australian wines into England up to a maximum of 30 per cent. proof spirit at the lowest duty of 1s. per gallon. As a misconception exists on this subject, we can assure all interested parties at home that it would not pay to fortify with brandy Australian wines for exportation, and that there is quite sufficient inherent alcohol in the wines to render such a course unnecessary. It has been demonstrated that wines are greatly fortified by a sea voyage, and when fermentation is not completed the rolling of the vessel greatly assists the process.

The best means of Improving and Advancing the Wine Industry.

W. B. CAMPBELL, Blacktown.

THE grape-vine is one of our fruit-plants easy to grow; no man who can handle a hoe or spade need be without this nutritious and delicious fruit in its season, and but little skill is required to make an ordinary wine. Considerable knowledge, however, is needful in the production of superior table grapes, and the manufacture of wine good enough to supply the markets of the old world, and will require all the skill and science we can bring to bear upon it. Considering its very profitable nature it does seem strange that this Colony has not more land under vine culture; the unfortunate introduction of disease such as oïdium and phylloxera tends no doubt to retard its progress. But why should it be so? No matter what industry or occupation we enter upon there are always serious

Digitized by Google

drawbacks to successful results, and in this case we have a paternal Government prepared to eradicate the most serious disease and to compensate the grower, though, it must be confessed, somewhat tardily.

What we require to increase and improve the production of wine is a State vineyard under the Department of Agriculture. The plan would be to select, without delay, in a convenient locality, 1,000 acres of land to commence with, near a railroad, within 100 or 150 miles of Sydney, and where suitable land would be available to the extent of 10 or 20,000 acres; engage a few steady men well up in clearing, trenching, and draining, as a permanent staff, then call upon the Sydney unemployed to come and assist in this national undertaking; it should not hurt the pride of any man to do such work as trenching at a given price per rod for the Government; there would be no charity about it because it would be a productive enterprise, whilst men of education and refinement, who cannot just now find congenial employment in the city, could accept this work and never need be ashamed to own that they had helped to form the New South Wales State Vineyard. Taking into consideration the necessary preliminaries, I presume that no vines could be planted this year, but clearing, trenching, and building might soon be commenced, with a view to giving work during the winter months to those who need it. Of course it would be highly necessary to adopt a scale of wages that would not clash with private enterprise.

In clearing the land it would be well to utilise the whole of the timber not suitable for fencing or staking in draining the land; by burying it in deep trenches or drains the fruitfulness of the vines would be greatly assisted thereby. Some there are who object to this plan of burying timber in vineyards, but practical experience has proved to me its efficacy. Thirty-two years ago I engaged a German to trench 1½ acres of poor, stiff, clay land, and I had the bottom of all the trenches covered with rough timber carted from an adjacent bush; the vines were planted; they are growing now, and have yielded as high as 900 gallons of wine in one season.

This proposed State vineyard, if formed, would greatly increase the production of wine, and could not injure private growers because, through the failure and decay of European vineyards, the demand for wine at the other side of the world is almost unlimited. Very great improvement in the quality of our wine would also naturally result from the importation by the Government of some of the greatest experts Europe can produce, and such an establishment would vastly assist the future prospects of our Colony, as labourers, fencers, builders, coopers, and skilled viniculturists would come to New South Wales to take part in this increasing and important industry; immense quantities of timber for cooperage purposes would also be required, and if our Minister will entertain such a scheme the whole community will have good reason to thank him.

After the discussion of improved methods for the increase and improvement in the production of fruit, naturally comes the question of the profitable disposal of it, which embraces improved methods of packing, transport, market accommodation, and, I may add, the very important subject of foreign export. This branch of the business is now in much the same state as was the frozen meat trade in T. S. Mort's time. A grand opportunity now exists for our Minister of Agriculture to signalise and immortalise his name amongst fruit-growers by assisting the introduction of a successful mode of packing fruit, so that it may be conveyed in a sound condition to supply, I may say, hundreds of millions of people in other parts of the world, when we should be able to realise a fair return for our produce, instead of, as now, being disheartened by witnessing its decay in the orchard,

Digitized by Google

or submitting to unremunerative prices. Naturally, I am referring more particularly to the orange or the citrus tribe generally, having annually a large surplus to dispose of, and there are hundreds of growers in the County of Cumberland similarly situated. It is an industry very pleasurable and practically unlimited if the foreign outlet can be safely accomplished.

Lemons are imported freely into Melbourne from Lisbon, and will keep good for weeks after arrival, and yet for some unexplained reason we are unable to send our oranges and lemons to England in a sound condition.

The time has now arrived when another trial should be made, a vigorous trial, and I beg to suggest and earnestly request that Mr. Anderson, the Director of Agriculture, will, with the consent of the Minister, send to England within one month a thousand cases of oranges, to be sold in London, the shipment to be collected in parcels of fifty cases each from twenty growers, or, if preferable, twenty cases each from fifty growers, each brand to be sold separately, and proceeds paid to growers after all expenses incurred by the Department are paid.

In this way many ideas of packing for export will be practically obtained, as each grower or dealer will use his own judgment. Of course each person would make known his method of packing to the department when he consigns his fruit. Many plans would thus be brought to bear upon this important question. The growers should place the cases carefully in the trucks at their several stations, and the Director of Agriculture would cause them to be carefully unloaded at Darling Harbour and placed in a suitable position on board the London steam-vessel.

If success attends this plan a wonderful impetus would be given to orange culture; thousands of acres newly planted would add to our prosperity; there would be no danger of overstocking the English market, where they would arrive in the scarce season, and millions of people would be ready to consume them.

The discussion of the papers was commenced by Mr. Whitaker, Parramatta, who said that Mr. Adams in speaking of refining had alluded to the good effects of Spanish clay. During the wet season of a few years ago most of the grapes were upon the ground, and no other thing would clear the wine but Spanish clay. This had been in use ever since, and was found to be one of the best refining agents. Some people objected to it, contending that it left an unpleasant taste in the wine. He had never found this to be the case. With regard to the Reisling grape, they have had to abandon its cultivation, because, when wanted for wine-making, it was more than half-rotten. No mention had been made, in any of the papers, as to the use of taps. This was a very important matter as it had been often found that wine was spoiled by brass-taps in the casks. He had known many good vintages spoiled by this means.

Mr. Lankester, Albury, said that while Spanish clay was a useful means of refining, it did not always answer. He had frequently found that its use imparted a rough taste to the wine. Albumen, and the white of eggs, was about the best for refining red wines, and isinglass for white wines. He quite understood how it was, that the Reisling grape did not succeed in Central Cumberland. The climate was altogether too moist. On the Murray, the weather did not interfere with its growth. He could not understand how, as Mr. Whitaker had said, brass-taps affected the wine, if it was passed rapidly through them. The paper which Dr. Fiaschi had read was a most important one. The suggestion which that gentleman had made, to analyse the wines

Digitized by Google

exhibited at our Agricultural Shows, presented insuperable difficulties. He was present at a recent show, where no less than 1,200 samples were sent in to be adjudicated upon. Seeing that about fifty shows were held during the year, it seemed to him almost impossible to analyse the whole of the wine exhibits. It might be possible to test the prize-winning wines, but this would cause dissatisfaction to the non-successful exhibitors. He quite agreed with Dr. Fiaschi, that wine importers should not act as judges at any of the shows, for they were likely to be prejudiced in favour of the wines they imported; at any rate they would not be fair judges of Australian wines. It was not at all desirable that growers or exhibitors should be present at the judges' decisions, as that would interfere with the operations. The judges did their work now under very difficult conditions, and the presence of a large number of strangers would only augment those difficulties. Mr. Campbell spoke of some disease which had destroyed his vineyard, but did not mention its nature. Probably he referred to *Oïdium tuckeri*. If the vines were properly attended to this disease would be exterminated. Sulphur was the most efficacious and economical remedy. He did not think any advantage would be gained by securing experts from other countries, to instruct us in wine-making. These gentlemen, though well versed in the capabilities of their own countries, would, when they entered new districts, have to unlearn much of their previous experience.

Mr. Frauenfelder, Albury, said he took it a good sign that no mention had been made of bad wines. Although he had no vineyards of his own, he had inspected many, and gained much experience of wine-making therefrom. Quite recently he had tasted wines which had been spoiled. It seemed to him that in every case the mischief had been done in the press-house. He had noticed that those growers who were in the habit of purchasing wines from smaller cultivators never blended them with their own vintages, until matured for three or four years. One of the essentials of wine-making was cleanliness. Great care should also be exercised during the period of fermentation. If the wine was correctly treated in its early stages it would take a great deal of careless bungling to spoil it—at least in the Albury district.

Mr. MacWilliam, Corowa, said that any one who was accustomed to judging at Agricultural Shows would see the impracticability of Dr. Fiaschi's proposal to admit exhibitors during the time of adjudication. If the judges wrote down their remarks it would, he thought, be preferable.

Mr. G. Willis, Corowa, offered the suggestion that each Agricultural Society should send to the department two samples of the wine of each exhibitor. The Government might appoint experts to analyse those wines, and he thought the results would be of great advantage to all the growers; for not only the prize wines but those that did not succeed in obtaining awards would be examined.

Mr. Kyngdon, Sydney, said that as the question of wine judging had been brought forward, and as he had been connected with the wine section of our Metropolitan Agricultural Show for some years, he would like to say a few words. He complimented Dr. Fiaschi on his extremely able paper. No doubt he had sketched out what some of them at the first blush might consider an impracticable scheme. It was certainly an ideal one, and all ideals were more or less impracticable, but he considered that they should aim at some such method as he had pointed out, by which the various shows would be both an education and a record. He did not think it at all possible to educate a pavilion full of people, but if an invitation could be extended to the producers of wines to be present while, bottle by bottle, the wine exhibits were tested and discussed, they, by a schedule of points agreed upon,

Digitized by Google

could decide the merits of the different vintages. By such a system an educational value would attach to such exhibitions. It was desirable that the prize wines should be analysed. He did not think it possible to test the whole of the exhibits; but a few could be selected, and a record of the analyses kept year by year. Mr. Adams had contributed a paper of great value. His description of the best methods of refining wine for home consumption would be most useful. If they could induce householders to purchase wines and cellar them until matured, a taste for Colonial vintages would thus be cultivated. The great object of wine-growers was to find a market. To achieve this they should first secure a local market, for that would pay best. The question of a Storage Company had been mooted. If established he believed such a concern would be one of the greatest benefits to Colonial wine-makers. The capital of the Company should be not less than £50,000. An undertaking of this kind would relieve growers of the financial strain, which the storage of wines for maturing cast upon their slender resources.

Mr. Adams, Liverpool, said they must all agree that Dr. Fiaschi's was an able paper. What he desired to say upon the Doctor's suggestions for an analysis of exhibited wines had been anticipated by the remarks of Mr. Lankester. It would be rather a heavy burden to test all the samples. Prize wines should, of course, be examined, and there were some at the bottom of the list which would merit examination. As a judge of thirty years' experience he had found no difficulty in arriving at a decision; it was an easy matter to say which was good wine and which was bad. Dr. Fiaschi recommended certain standards for wine-testing. In the past great misunderstanding and confusion had been caused by the want of a uniform standard. He believed that the Albury dispute could be traced to a misapprehension of the standard of alcohol. For instance, Mr. Bonnard had spoken of strong wines of 15 degrees, while Mr. Lankester had stated that the wines of the Albury district rose to 30 degrees. He could only account for this difference by presuming that each of these gentlemen used a different alcoholic standard. If the department adopted proof spirit alone as their standard it would be one which all wine-makers would understand, and that is the system adopted by the Customs. With regard to specific gravity there was always a doubt about saccharometers. In the Hunter River district they had a scale which fortunately also gave the specific gravity. The latter test was one which should be generally adopted, because it was understood by all countries. It was simply a comparison of the weight of any fluid with the weight of water, and the advantage was that it was possible that, when the wines fell below the density of water, their specific gravity could be arrived at. He thoroughly agreed with what Dr. Thudichum had said as to the alcoholic strength of wine. He had tested a great many vintages, and had only once found more than 26 per cent. of proof spirit. So that there should be no mistake, he fermented a sample of wine a second year with new must, and he obtained at the utmost 26¼ per cent. of spirit. This was the standard which it had been said could not be exceeded in the process of natural fermentation. He had never been able to obtain a higher standard, and he very much doubted whether it could be attained.

Mr. Freeb, Thurgoona, in answer to what Mr. Adams had said as to the alcoholic strength of wines, stated that he had tested many samples himself, in which he was sure that no alcohol had been put, and the standard in each case exceeded 26 per cent., and even up to 35 per cent. It was quite a common thing with them to obtain a larger percentage of alcohol in wines.

Digitized by Google

The DIRECTOR said there was one matter to which he wished to refer, and it was the allusion which Mr. Beattie had made to ferruginous soil for grape-growing. He believed it to be a fact that a certain amount of iron was beneficial, but there could be too much of it, and a striking instance of this came under his notice recently. A gentleman in the country sent him some soil for examination. It was as pretty to look at as any he ever saw; it was what had been referred to as a rich chocolate friable soil. The gentleman informed him that he had planted vines in it, and that they would not grow. The soil, on being analysed by the chemist, was found to contain 3·5 of ferric oxide—a percentage too high to allow of any crop being grown. This little fact showed the mere appearance of the soils was no guide to them. Referring to what has been said of analysing wines, he noticed that one suggestion had been made by Dr. Fiaschi—to whom the department was much indebted, for it was only by the co-operation of such gentlemen that the department could be successfully carried on—and it was that samples should be sent to the department for future reference. In years to come this suggestion, if carried out, would furnish them with valuable data. It had been said that wine-growers should be present when their exhibits were adjudged. He believed that every grower should be informed what the quality of his wine was. If it were inferior, and he was told where the fault lay, the grower would endeavour to remedy matters; but how could he do this if he were simply informed that his wine was not as good as someone else's? After the competition the judges should give reasons for their decisions, and they would be much aided by a few chemical investigations. They should ascertain the quantity of acid, of proof spirit, and whether there was any acetous fermentation going on at the time, and other little points which a chemist could best ascertain. The results of the wines examined by the department would be an educational agency. He looked upon these shows as so many examinations conducted for the general good.

Mr. A. E. DAVIS, Allandale, said he hoped that the Agricultural Societies in the Colony would read Dr. Fiaschi's paper, and, as far as possible, act upon it. In the past wine-growers had had a sad experience of the Sydney Shows, the management of which required considerable improvement. If all the societies adopted the suggestions which had been offered, he was sure they would have the cordial assistance of the wine-growers in their endeavours.

Dr. FIASCHI, Richmond, said he wished to emphasise what Mr. Adams had said about the use of shot in washing bottles. By this process the inside of the bottles were coated with a slight film of carbonate of lead. The better plan was to wash, first with soda, then with an acid solution, and finally with water. Mr. Adams had made mention of refining powders and refining liquors. He had only one word to say of them, and it was condemnatory. They were absolute quackery. He advised all wine-growers not to buy such things. If any grower had a wine which would fine, when there was a department of oenology he could send a sample, and it would be analysed, and he would learn what to do. He recommended them never to resort to any so-called refining powders and liquors. Wines were as susceptible to disease as human beings, and when once affected they were good for nothing. The grower, by proper attention, should endeavour to prevent their becoming diseased. Some diseases there were which could be checked at an early stage, and by means so simple that they would not interfere with the hygienic properties of the wine. There was a disease commonly called ropiness which was due to the presence of tannin in the wine. This, if

Digitized by Google

grappled with in time, and placed in sulphured casks, with a little tartaric acid, might be saved. There were other diseases which, if they got into the wine, could not be driven out and rendered it useless. He agreed with a great deal Mr. Frere had related, and he would add to the localities he had mentioned the Hawkesbury River District. The peculiarities of the soil and climate in that part of the Colony were very much like the cases he had quoted. There was one point which had been raised by Mr. Campbell, to which he must take exception. That gentleman had advised an area of 1,000 acres for and experimental farm. He felt sure the Agricultural Department would defeat its objects by having so large an estate. It would be much better, instead of one large farm, to have several small ones scattered through the country. The great area of the farm, as suggested by Mr. Campbell, would deprive it of the advantages they sought, which were experiment and teaching. Pupils would learn very much more on small vineyards of from 10 to 20 acres. The question of what timbers were most suitable for making wine casks was one which should be discussed at a future conference. Mr. Bonnard, in his paper, urged the abolition of the duty on wine. He was sorry he could not agree with that gentleman in his demand. In France there was not only a duty upon imported wine but there was also a duty upon the wine produced in the country itself. He was surprised at Mr. Adams advocating the establishment of specific gravity as a standard for testing the amount of must in the wine, and subsequently urging the adoption of proof spirit, as a test standard. He considered that proof spirit was somewhat behind the age, and to keep abreast of science they must adopt strict scientific methods. The proper thing to do was to ascertain the percentage of absolute alcohol. Reference had been made by some speakers to the acids which should exist in wine, and which were very good; but acetic acid was not one of them. As to what Mr. Lankester had said, relative to the large number of wine samples at Agricultural Shows, he thought there must be some mistake. He remembered attending one of the largest exhibitions at Bordeaux, the centre of a great wine-producing country, and the number of samples was only 800.

Mr. Lankester, Albury, the show to which I referred, and at which 1,200 samples of wine were exhibited, was held just over the border at Rutherglen in Victoria. The number of vignerons was not large, but each sent a great many exhibits.

Dr. Fiaschi said, that even if the samples numbered 1,200 it would not take long to chemically analyse them if they had persons accustomed to the work, and with the proper materials. In the old country students were trained, not only to analyse but to taste wines, and this formed the largest portion of their practical work. Those who were called upon to judge wines should be provided with every convenience. Mr. Vizitelly, in his admirable book, entered a strong protest against the examination of wines in a warm room. Coming now to the question of admitting visitors during adjudication, he was very glad the suggestion he made had been so freely commented upon; it was capable of improvement, and he was prepared to accept any modifications which they thought would be beneficial. He desired to see exhibitors present, not so much that they might hear what the judges had to say, as that they might have an opportunity of tasting the wines, comparing notes with their fellow growers, and forming their own opinions. Of course this information could be obtained by other means, some of which have been suggested, and were very good. Before concluding, he wished to refer to the paper which Mr. Whitaker had read, during the previous day, on the cultivation of the grape vine, and which contained a list of the different varieties

Digitized by Google

of vines grown in the Colony. Mention had been made of grapes, which he had no idea existed here, and this suggested to him how desirable it was that the Government, in the future, should obtain a comprehensive collection of the different varieties of vines. There was no knowing when some of the vines, which they were now despising, might become useful; most probably changed conditions would bring this about.

Mr. WHITAKER, Parramatta, remarked that the first vines came from the Botanical Gardens. Subsequently many varieties were imported, until the number exceeded 200.

Mr. CAMPBELL, Blacktown, said he firmly believed that the introduction of one or two experts would be of great value to the Colony, as through their researches vine-growers would ascertain how to finish and blend their wines, so that they would be suitable for the markets of the old world. He was somewhat surprised that no mention had been made in any of the papers of the value of the *pineau noir*, for making wine, some of the best Colonial wine he ever tasted, had been made from that grape. He was somewhat surprised that no mention had been made in any of the papers of the value of the timber of the Mountain Ash (*Eucalyptus regnans* or *E. sieberiana*). This was a most important matter and it ought to receive some attention.

Mr. LANKESTER, Albury: It has been used in the Murray District, but it was not found suitable.

Mr. CAMPBELL, *continuing:* Surely there was some Colonial timber suitable for cask making, and it must be in use in some of the large vineyards.

Mr. STEIME, Fairfield, said he wished to make a remark relative to wines which were bad and could not be utilised. In 1888 a quantity of his grapes were damaged by the wet. He knew the fruit would not make wine, so he fermented it for vinegar. He crushed it and put it in a cask, which he placed in the sun, and let it take its chance. The result was that he obtained an excellent and powerful vinegar without using chemicals of any kind. He had brought a bottle with him, and he wished Mr. Anderson to analyse the contents. In this case it was the fruit which was bad not the wine.

Mr. LANKESTER, Albury, thought he must have been misunderstood in his remarks upon bad wine. What he intended to imply was, not that bad wine was useless but that it could not be converted into good wine again. He knew that wine vinegar was one of the best we had.

The PRESIDENT said he could not allow the opportunity to pass without expressing his great gratification at the papers that had been read. They, one and all, had reason to be thankful to the gentlemen who had contributed them, and who, no doubt at personal inconvenience, had to attend to read them. The information contained therein would be of great value to the country.

Digitized by Google

Pests—Animal, Insect, Fungoid, and Weeds:

THE BEST MEANS, LEGISLATIVE OR OTHERWISE, OF KEEPING THEM IN SUBJECTION; AND OF RECOGNISING AND ENCOURAGING FRIENDLY INSECTS.

Insect Pests and Australian Agriculture.

A. SIDNEY OLLIFF,
Entomologist to the Australian Museum and Department of Agriculture, New South Wales.

In dealing with those insects which are hurtful to the gardener and cultivator it should be borne in mind that when our country was in its primitive state, untouched by the hand of man, any given species took its proper work and place in nature's economy, rarely preponderating to the injury of the wild plants. But when man came to till and to cultivate, many insects which naturally fed upon the plants he grew found abundance of food, and multiplied accordingly. It has thus come about that the cultivation in large areas of one particular kind of plant has resulted in an increase of particular pests. To illustrate my meaning it is only necessary to instance the Cottony Cushion Scale (*Icerya Purchasi*, Mask.) of the orange, and the Hessian Fly (*Cecidomyia destructor*, Say) of the wheat, species which have caused immense havoc in America and in South Africa, where they have found abundance of food brought together by the orchardist and farmer. Apart from this inevitable increase of native or indigenous species, many others have been imported with plants and cuttings, and also in the ordinary course of commerce, from one country to another; for it is well known that some of the most destructive insect pests of Australia have been introduced accidentally from Europe and America, and similarly some English pests came from the East, and some American pests from Europe. In these matters, indeed, a fair exchange may be said to take place, for we are responsible for sending a very troublesome creature in the shape of the Cottony Cushion Scale (*Icerya Purchasi*, Mask.) to our American cousins and to our brother colonists in South Africa. If we take only a casual glance at the destruction which occurs every year to our crops we shall perceive that if these ravages could be brought under control, by lessening the number of the injurious kinds whenever they appear in excess, the benefit would exceed anything of which we have any conception.

Dr. C. V. Riley, the United States Entomologist—one of the most energetic workers in the field of practical entomology—gives some interesting figures with regard to the losses caused by insect ravages in the United States. He says: "The losses occasioned by insects injurious to agriculture in the United States, are, in the aggregate, enormous, and have been variously estimated at from £60,000,000 to £80,000,000 annually. It will never be possible to fully protect our crops from the ravages of the many species that injuriously affect them; but it is the aim of the economic

Digitized by Google

entomologist to prevent as much of the loss as possible and at the very least expense. To do so effectually, the chief knowledge required is of an entomological nature, *i.e.*, the full life-history and habits of the different species: and this implies a great deal of close and accurate work in field and laboratory. By means of it we learn which species are beneficial, and which injurious; and the ability to distinguish between friend and foe is of the first importance in coping with the latter, for it is a notorious fact that the farmer often does more harm than good by destroying the former in his blind efforts to save his crops. A great deal has been written and published of late years on the subject of economic entomology, much of it, however, at second hand; for, unfortunately, the original workers are few. That comparatively small progress has hitherto been made is due to this last fact, as well as to the intricacies and complex nature of the subject. The economic entomologist, to do effectual work must possess, not merely a knowledge of the particular injurious species and its habits, with which he wishes to deal, but must study its relations to wild plants as well as to the particular cultivated crop it affects. He must also study it in its relations to other animals. Indeed, its whole environment must be considered, especially in connection with the farmer's wants, the natural checks which surround it, and the methods of culture that most affect it."

The earliest workers in this field were, probably, Markwick and the venerable William Kirby, the father of British entomology, who began the good work by publishing papers on the economy of certain destructive species in the early volumes of the Linnean Society of London. These were soon followed by John Curtis, the author of "Farm Insects," J. O. Westwood, Edward Newman, and Andrew Murray, in England, Guérin-Méneville and Bazin, in France, Taschenberg and V. Kollar, in Germany, Passerini in Italy, and Thomas Say, T. W. Harris, and Asa Fitch, in America; and since their time an increasing band of workers has appeared, including Miss Ormerod and such men as Walsh, Le Baron, Glover, Matthew Cooke, C. V. Riley, William Saunders, A. S. Packard, J. A. Lintner, J. H. Comstock, and L. O. Howard. In New Zealand Mr. W. M. Maskell has given considerable attention to the subject, particularly to the scale-insects or Coccididæ, many of which are highly injurious to vegetation; and in Australia useful papers have been published on insect-pests by Mr. F. S. Crawford, of Adelaide, and Mr. Henry Tryon, of Brisbane. It has already been briefly indicated that a thorough and exhaustive knowledge of the life-history and development of the various species is necessary before we can hope to cope with the evils which arise from the prevalence of the hurtful kinds, and such knowledge is often only to be acquired by extended observation and research.

It took Dr. Riley five years, with a number of observers at command, to definitely settle some points in the life-history of the cotton worm (*Aletia xylina*, Say) and with all the resources of the French Government—its liberal premium, its superior and sub-commissions appointed for the purpose—there is much that is yet mooted in reference to the Grape Phylloxera. You have all heard of this insect, and perhaps a brief statement of its habits will serve to illustrate the complicated problems with which the economic entomologist often has to deal.

Dr. Riley says,—"The full life-history of the species exhibits to us no less than five different kinds of eggs. 1. The regularly ovoid egg, 0·25 mm. long and half that in diameter, of the normal, agamic and apterous female, as it is found upon the roots. 2. The similar but somewhat smaller egg of the gall-inhabiting mother. 3. The female egg from the winged mother, rather more

Digitized by Google

elliptical and 0·4 mm. long when matured. 4. The male egg from same, 1·4 less in length and rather stouter. 5. The impregnated egg, 0·32 mm. long, still more ellipsoidal and with peculiar sculpture and anal point. We have also the peculiar spectacle of an egg from the winged mother increasing from 0·34 mm. (its size when laid) to 0·4 mm. (its size just before hatching) giving birth to a perfect insect 0·4 mm. long, and this, without any nourishment, laying an egg 0·32 mm. long. A being thus born, and without food whatsoever, lays an egg very nearly as large as that from which she came.

"We have, further, the spectacle of an underground insect possessing the power of existence even when confined to its subterranean retreats. It spreads *in the wingless state* from vine to vine, and from vineyard to vineyard, when these are adjacent, either through passages in the ground itself, or over the surface; at the same time it is able in the winged condition to migrate to much more distant points."

When it is borne in mind that the life-history of phylloxera is among the most complicated in the insect world, and that in its earlier stages, it is scarcely visible to the naked eye, I think you will agree with me that, in endeavouring to cope with this terrible pest, it is our duty to have the best technical advice available. The mere identification of the insect in its early stages, a matter of the greatest importance, is often attended with no small difficulty, a point in which I differ from the writer of an interesting historical article on the Grape Phylloxera recently read before the Conference. If proof of this were needed one might point to the fact that more than one experienced vine-grower in this Colony has mistaken other minute animals which live on the roots of the vine for the *Phylloxera vastatrix*. Indeed, one gentleman, whose name has been associated with wine-making for many years (mistaking a minute mite or Acarus for the true pest), has gone so far as to maintain that he has had the disease among his vines for thirty years, and that it has never done any material harm.

Before bringing this very imperfect and hastily prepared address to a close, I should like to say a few words about the various insecticides that have been found useful in combating insect attacks. The time has not yet come when the subject of insecticides and the best methods of applying them can be adequately dealt with. Before this can be done it will be necessary to profit by the experience of those enterprising fruit-growers and agriculturists who have already given their attention to these matters, and met with some measure of success in their efforts to cope with the various pests which constantly assail their crops. To this end I would urge, as a practical step in that direction, that evidence should be obtained at Parramatta, at Goulburn, and in all the centres of fruit-growing activity, with a view to its collation and classification. This is a work the Department of Agriculture might well take in hand, as it is by means such as this that we may hope to learn which remedies are best suited to our climate and circumstances. In America a great deal of attention has been given to experiments with insecticides, and in bringing the subject to your notice it is only right to state that I am indebted for the facts and suggestions in this paper to the Reports of the United States Entomological Commission, and especially to the writings of Dr. C. V. Riley, which are often quoted verbatim.

Of the many substances and compounds used as insect destroyers, the following are the best known:—Lime, sulphur, soot, salt, wood-ashes, corrosive sublimate, naphtha, naphthaline, turpentine, alum, carbolic acid, phenyl, cyanide of potassium, green vitriol, ammonia, alkalies, benzine, vinegar, sulphuric acid, blue vitriol (sulphate of copper), hot water, &c. Most

Digitized by Google

of these may be successfully used for specific purposes either dry, in liquid, or in vapour; but the three most useful insecticides of general application in use during the early days of economic entomology in America and up to within a few years, were undoubtedly tobacco, white hellebore, and soap. Tobacco water and tobacco smoke have long been employed against Aphides and other delicate insects, and are most useful. A quite recent advance in its use is by vapourising. The vapour of nicotine is most effectual in destroying insects wherever it can be confined, as in greenhouses. Thus the boiling of tobacco in such a greenhouse is as effectual as and less injurious to the plants than, the older methods of syringing or of fumigation by burning. The vapour gradually arising from tobacco stems strewn on the ground and regularly moistened is likewise effectual.

White hellebore, either in dry or in liquid, has long been one of the most satisfactory insecticides against Saw-fly larvæ, otherwise known as false caterpillars; while syringing with soap-suds will kill some soft-bodied plant-destroyers, and when used as a paint on the trunks of trees is an excellent repellant against the parents of different borers.

More important, however, than any of these insecticides are the three now most commonly used. They are—(1) arsenical compounds, (2) petroleum, and (3) pyrethrum. The first act through the stomach, and are effectual chiefly against mandibular insects, *i.e.*, those insects with biting mouths; the second and third act by contact, and are therefore of more general application, affecting both those insects with mandibular or biting mouths and those with sucking or haustellate mouths.

The use of arsenic as an insecticide in the field dates from the year 1871. At the rate of 50 grains of arseniate of soda and 200 grains of dextrine dissolved in a gallon of water and this diluted at the rate of about an ounce to ten gallons of water, it furnishes one of the cheapest of insecticides at command, and various patented combinations of it have been extensively sold and used. Again, one pound of arsenic and one pound of sal-soda boiled in one gallon of water till the arsenic is dissolved, and diluted at the rate of one quart to forty gallons of water is also a good formula. The chief merits of arsenic are cheapness and solubility. Its demerits are its white colour, which makes it liable to be mistaken for harmless substances of the same colour, and its tendency to burn the plant. Paris Green or Scheele's Green has been more extensively used than any other arsenical compound, and is, on the whole, one of the most satisfactory insecticides.

A refuse obtained in the manufacture of aniline dyes, and known as "London Purple," is the third important arsenical compound.

It is used with diluents, either wet or dry, in the same manner as Paris Green. For some insects experience has shown it to be less satisfactory than Paris Green; for many others it is equally effective, and has the great advantage over Paris Green of being cheaper; of covering twice the ground, weight for weight; of being more soluble, less poisonous, more adhesive, and permanent in its effects.

The following receipt is recommended by Dr. Riley for certain pests, and other applications will suggest themselves:—Forty gallons of water, ¼ to ¾ lb. of London Purple (or ½ to 1 lb. of Paris Green), three quarts of flour, the solid ingredients intimately mixed with the water by washing them through a strainer, sprayed upon the trees by means of a force-pump and nozzle, was found to effectively destroy web-worm. The effect of the poison is sometimes not observable until after three or four days. Care must therefore be taken not to overdo the spraying.

Digitized by Google

Petroleum, in its various forms, has long been recognised as one of the most effective insecticides known, all oily substances being particularly deadly to insects. Unfortunately, they are also injurious to plants, and they can then therefore only be applied after the discovery of suitable methods of diluting them so as to kill the insects without injury to the plants. Refined kerosene has been used to a limited extent, by forcible attenuation in water and spray, while some plants withstand doses of the pure oil. Of the various substances used in attempts to emulsify and mix kerosene with water, none are more satisfactory than soap and milk. An emulsion resembling butter can be produced in a few minutes by churning with a force-pump two parts of kerosene and one part of sour milk, or soap solution, in a pail; emulsions made with soap solutions being generally found to be the more effective. The liquids should be at about blood heat. This emulsion may be diluted with from nine to fifty parts of water which should be thoroughly mixed with one part of the emulsion.

The strength of the dilution must vary according to the nature of the insect to be dealt with, as well as to the nature of the plant; but, finely sprayed in twelve parts of the water to one of the emulsion, it will kill most insects without injury to the plant. The spraying should be done by a force-pump through cyclone nozzles; it is best done in the cool of the day, and, where possible, in calm or cloudy weather; two or three sprayings at intervals of a few weeks being preferable to a single treatment.

The following is a good receipt:—Two parts of oil to one of soap solution or milk (the soap solution being made by dissolving from a quarter to one pound of common soap, or whale-oil soap, in one gallon of water). The whole is violently agitated, at a temperature of about 100° F., by driving it backwards and forwards through a spray nozzle. The emulsion thus formed is diluted with nine parts of water. Flour or resin soap-wash is sometimes added to the kerosene wash, to give it greater adhesiveness, and 4 or 6 ounces of arsenious acid (or half a pound of arsenic, half a pound of sal-soda, boiled in half a gallon of water till the arsenic is dissolved; or half a pound of London purple) is sometimes added to each 100 gallons of the wash, to render it more effective.

Pyrethrum roseum and *pyrethrum cinerariæfolium*, two plants, natives of Asia and Europe respectively, have long been known to possess insecticide properties, especially the powder from the dried and pulverised flowers. This powder can be used in liquid solution, and its action on many larvæ is marvellous, the smallest quantity paralyzing and ultimately killing. As the insecticide property dwells in a volatile oil its influence in the open air is evanescent, in which respect it is far inferior to the arsenical products; but, being perfectly harmless to plants, it can frequently be used on vegetables where the more poisonous substances would be dangerous.

Of all insecticides to be used against root-feeding insects naphthaline, sulpho-carbonate of potassium, and bisulphate of carbon are the chief. It has recently been shown that naphthaline in crystal may be satisfactorily used under ground, destroying by slow evaporation. But bisulphide of carbon still holds the first place in France against *Phylloxera vastatrix*. Large quantities of the latter are now imported from England into Cape Colony for the purpose of treating the phylloxerated vineyards.

In conclusion, I should like to say a word as to the work and requirements of an economic entomologist. I venture to think that his work should be to a large extent practical, and should include the investigation of all insect-pests or supposed insect-pests, which affect agriculture or horticulture in their broadest sense, as well as the investigation of insects injurious to

Digitized by Google

food crops (hop plants, root crops, corn, grass, pea, bean, and clover crops, &c.), forest trees, and fruit crops, and those which cause injury in granaries and barns. It should be his business to make detailed observations as to the life-histories and habits of all friendly and injurious species, with a view to encouraging the former, and of devising effective means of combating or preventing the ravages of the latter.

To properly carry out this work it would be necessary to have suitable accommodation in the shape of a laboratory for rearing insects, and for practical experiment. Economic entomology is yet in its infancy, and it is essential, if useful work is to be done, that the worker should be provided with the means of carrying on original research in the form of housing for his rearing-cages and apparatus, especially in view of the fact that little or no work of this kind has yet been done under the conditions which hold in Australia, and that the life-histories and habits of many of the insects—both injurious and beneficial—which affect agriculture in Australia, are entirely unknown. If suitable accommodation for this purpose were provided the entomologist would be enabled to conduct accurate and satisfactory experiments with chemical agents, insecticides, &c., under proper conditions, and really valuable results might be expected to ensue. But without this accommodation the usefulness of the entomologist would be seriously curtailed, as, apart from the observation of the insects themselves, it is necessary in experimenting with insecticides that observations should be made in the laboratory where the conditions can be controlled, as well as in the field, a fact which in France and in America is now fully recognised, and which in England is daily becoming more fully acknowledged. Besides these duties of investigation and experiment, I would submit that the dissemination of trustworthy information amongst farmers, horticulturists, and others, regarding injurious and beneficial insects, and the most approved methods of coping with the latter, is a matter which should receive attention.

Accommodation for rearing insects and experiment has now been provided by the United States Government, under the Hatch Experiment Station Act, in something over twenty of the State experiment stations in connection with the various State Agricultural Colleges, and qualified entomologists have been appointed to the charge of the economic and biological work carried on in these institutions. In Australia we may hope to carry out similar researches; already New Zealand, South Australia, and Queensland have led the way, and I believe Victoria and Tasmania are likely to follow their example.

In the Indian museum economic entomology is receiving attention, and I am glad to notice that experiments with insecticides are being made in a systematic and exhaustive way under the auspices of the Government of India.

The Phylloxera Vastatrix.

The Honorable P. G. KING, M.L.C.

This insect pest, has been before the public since its discovery in the Camden district in May, 1885, when it was reported to the Government by Dr. Lendenfeld. It had long been known as a scourge at Geelong, causing the whole of the vineyards in that neighbourhood to be ruthlessly destroyed. The effect, however, of making no distinction between infected and apparently non-infected vineyards has been, after nine years' patient work and watching, to thoroughly confine the pest to that district, and thus preserve all the other vine districts of Victoria from its spread. It was also

Digitized by Google

known at Hunter's Hill, on the Parramatta River, and there is reason to believe that many vineyards elsewhere, which have dwindled away or died out, had been for years affected. As an illustration of this idea, it may be stated that the vineyard at Camden Park, in which the pest was discovered, had been carefully prepared, the ground having been well trenched, drained, and afterwards worked in the most approved manner, under the immediate direction of Sir William M'Arthur. Five or six years after it had been planted a few vines showed symptoms of being unhealthy, and this continued year by year, the numbers of failing plants increasing from time to time. The ground was again and again dug over, and the system of trenching extended, but still the decadence of the vineyard was not arrested. Roots were examined by experts and pronounced to be suffering from dry rot, but, as has been seen since, the dry rot was the effect and not the cause of the plants dying off. At length Mrs. Onslow, who had become the owner of the vineyard, sought further advice, and the phylloxera was detected, but not until half the vines had been destroyed, nor until every vine having life in it was more or less attacked. From this example it may readily be seen how likely it has been that vineyards which have died off from unknown causes may have been unobservedly undergoing the operations of the pest in question. Now that some experience has been gained, there can be no difficulty in at once determining its existence or otherwise. The healthy appearance generally of the vineyards throughout this Colony is good evidence that the pest has not spread beyond the known limits at Camden and Seven Hills, and it may be hoped that the work performed by the Phylloxera Board will prove effectual in wholly extirpating it. So far there is generally a considerable distance between the vineyards in the Colony, and this has operated to prevent the spread by reason of the vast extent of intervening forest intercepting the flight of the winged form of the insect. It may be useful to show what has been attempted by way of legislation to deal with this subject. It was so little understood at first that it is no wonder that no practicable measure was adopted by Parliament. All useful consideration was met by one cause or another. It was alleged that the pest was already more widely spread than known of, and that it was impossible to deal with it. Fear was entertained that the claims for compensation would be enormous, and owners of vineyards in a naturally decaying state might put in their claims under the plea of phylloxera. Wholesale eradication of vineyards was urged on one side and deprecated on the other. Remedial measures were strongly advocated, in spite of the well-ascertained fact that a reward of £12,000 had been offered by the French Government for a cure, and that it had never been claimed or paid; ignorance of the question underlay every objection to any useful legislation, and indifference to the danger, on the assumption of superior skill to deal with it manifested itself in one highly influential person, who subsequently admitted his mistake. An Act to deal with the disease was passed in 1886 and amended in 1888; the former proving inoperative and the latter barely escaping similar disability for any good purpose. The Board under the latter Act was supposed to have increased powers; but, differing in opinion for a length of time did little or nothing, until a section of it obtained permission to commence work; and as a result the affected vineyards at Camden have been destroyed, and those at Seven Hills will also in a short time have shared the same fate, the owners being liberally compensated for their loss. Prior, however, to any action being taken under legislative authority the owner of the vineyard at Camden Park, satisfied that the first loss was the best, after vainly adopting the remedial measures which had been recommended, rooted up and burnt every vine on the estate, levelled the

Digitized by Google

ground and replanted it with orange trees. No compensation was thought of, but a new vineyard was planted in sandy soil some distance away, and this was in full bearing during the last season. As with the vineyard just alluded to, so with every other which may be found to be affected with phylloxera—the only safe remedy is extirpation. Every vine must be taken out and burnt at once with as many rootlets as possible. Then, to make assurance doubly sure (but not thought by many to be absolutely necessary) the whole of the ground should be trenched, and every remaining rootlet sought for and burnt, together with stakes and any adjacent rubbish. It cannot be doubted but that every root or rootlet cut off from the bud producing-part of the stem must, if left in the ground, rot and die. Vine roots so severed cannot throw up shoots or leaf-growth, and without leaf-growth must eventually disappear. Then let it be considered how much sooner this must take place if each rootlet is affected with the vine-destroyer phylloxera, accelerating the natural decay. Once the ground is levelled over, and any stray shoots or leaf-growth appearing again removed and burnt, let it so remain under an orange crop or some surface-growing grasses, until all danger is past. The insects which may remain in the ground, having destroyed what little has remained of their own particular food, must die. They cannot come to the surface having no stem to come up by, nor to use as a breeding place close to the surface, whence the winged insect may fly away and stock new colonies; it is fairly imprisoned for life, and that life must be short. It must be taken as proved that phylloxera is not the outcome of neglect or impoverishment of the vine. It will always be found preferring young succulent roots belonging to vines of vigour, and up to a certain point, even to near the ripening of the fruit, of excellent health. In my opinion no expert is required to find it in a vineyard, for any tyro can learn its appearance in a single lesson. It is easily found with a small lens, or even with the naked eye. In a group or family it presents the appearance of green mould, for which it has been mistaken; single individuals even can be seen with the eye. The writer believes that the spreading power of the insect is limited to its winged state; and even then to be very slowly performed, that is to say, that it will take some years to discover its existence in a vineyard after it has been affected. He doubts its power of progress underground, save where vine roots intermingle, and that it cannot go from root to root through soil, and consequently cannot go from a root underground to the surface through the soil. No scientific description of the insect is attempted in this paper, save that it belongs to the order Hemiptera, and that its power of fecundation under favourable conditions baffle all computation. In France the difficulty has been overcome by destroying the vineyards and replanting them with American stocks of phylloxera-proof varieties upon which the table and wine-making grapes have been grafted.

How to exterminate Phylloxera without uprooting and destroying the Vines.

Mr. F. A. Bucholtz, Mudgee, read the following extracts from a paper on this subject, which had been compiled by P. J. Feidler, Director of the Imperial Agricultural College, Büsach:—

The endeavours of France, Spain, Portugal, and Austro-Hungary to exterminate Phylloxera, by means of uprooting and destroying the vines, have been, to a certain extent, futile, for although the spread of the pest has been checked it has not been eradicated.

Digitized by Google

Certainly some experts have advocated uprooting the vineyards wherever the louse has appeared, whilst others have advocated that this uprooting should be continued for the present, but that every endeavour should be made to discover an effective remedy. For the latter consider that the wholesale destruction of vineyards would be a national calamity, and that it should, if possible, be averted. With this object in view I have been experimenting during the last ten years, with the result that I am of opinion that it is unnecessary to injure or uproot the vines, in order to evade the ravages of phylloxera; and I would call your attention to the following requirements, which a remedy for phylloxera should fulfil, to be of any value:

1. It should give the vine such a condition that it will be able to withstand the attacks of the louse.
2. It must prevent the pest from spreading and increasing.
3. It must not be in the least injurious to the vine as a plant, nor give an objectionable taste to the grape.
4. It must be continuous in its effectiveness for a year or more, either directly or indirectly.
5. It must be simple, so that anyone, in any locality, in all kinds of soil, at all seasons of the year, and without any specially-trained help, can apply it.
6. It must place the vine-grower in a position to apply it, without injuring or affecting his neighbours' crops.
7. It must not be expensive, and must be obtainable at all times.

The remedy which I have found to fulfil these requirements is called "creosote."

Creosote is procured from coal tar, and contains within itself a great variety of other chemicals, the actions of which are manifold, are brought into activity by every atmospheric change, and are therefore particularly adapted for the destruction of the insect. It is cheap (as it involves an outlay of less than a penny per vine), easily applied, and not hurtful to any kind of vegetation unless the application be too strong.

It may be used (*a*) in a pure state by placing tubular poles between the vines and pouring down the liquid, when it will permeate in the form of a gas throughout the whole of the soil—(*b*) or it may be mixed with water (one part of creosote to five, ten, fifteen, twenty, twenty-five, or more parts of water), and applied by means of watering-cans upon the surface of the ground after it has been roughly hoed. This mixture destroys phylloxera in two ways—(1) by touching them—(2) by throwing off a gas which will destroy them.

If this remedy be applied at the proper time it will prevent the flight of new swarms of insects.

The following is an instance of the application of creosote:—Fifty poles impregnated with creosote were put to the vines, and each was treated with about 1¼ pints of pure creosote on the 23rd of June. The first examination was made on the 6th of the next month. The following were the results:—

No. 1 Vine.—Several insects were found on the root, stem, and on the roots, shrivelled up and dead.

No. 2 Vine.—One living insect was found among the dead ones; this was at a depth of from 1 foot 3½ inches to 1 foot 7½ inches, on a spot hardly reached by the creosote.

No. 3 Vine.—All insects were dead, except at a depth of 1 foot 7½ inches, on a spot not reached by the creosote, where three living insects were found.

Digitized by Google

No. 4 Vine.—All the insects were dead.

No. 5 Vine.—The best results were obtained; the fibrous roots were covered with fresh nodules, but these had been completely deserted.

On all the other vines examined not a living insect was found.

On the 8th of the same month five other vines were examined with the best results. The remainder of the vines treated were likewise free from living insects, while the roots of adjoining non-treated vines were covered with them.

Creosote if properly used will prevent both the multiplication and spread of the insect to such an extent that viticulture may be profitably carried out. It not only kills the insects on the roots, but also prevents the pest from extending by cutting off the escape from the ground of the winged insects which is of the greatest importance for the purpose of the long-winged insect is to propagate its species in fresh fields, and young colonies of phylloxera have been known to increase their species by twenty generations in one season.

The uselessness of undergoing the expense of destroying the vines will be apparent when we consider that when the field is found to be infested many colonies of insects have already taken flight to fresh fields.

In Hungary the disease has spread very rapidly, and they have come to the conclusion that uprooting the vineyards is of no use.

That the planting of American sorts are of some use, but the kinds are not always suitable to the soils, and may perhaps when they become acclimatised become amenable to the disease.

The probable reason why American stocks resist phylloxera is that they are seedlings, and therefore grow very shallow. This brings the roots in contact with a higher temperature than is ordinarily the case, which is injurious to the insect.

Success seems to be attending this course.

Dr. V. Düring writes, in a German paper, that for thirty years the cultivation of European vines was carried on successfully in California, but at last the phylloxera (which is supposed to have been introduced with cuttings from France) made its appearance in two districts and spread rapidly; all kinds of old and new remedies were tried, but without avail. Even the grafting of European varieties upon so-called American blight. Proof stock has not been a success because by the ennobling of the same and the scientific pruning to which it is subjected, the new vine becomes in time weakened and as susceptible to the disease as others.

In the vegetable kingdom as in the insect world a continued unnatural propagation of a species necessarily leads to a greater weakening and increased susceptibility to sickness of all kinds, also to a lessening of fruitfulness and to ultimate annihilation.

Upon these facts we hope to arrive at some tangible method of making our vines more resistent.

If viticulture is not to be completely ruined the vine must be regenerated from time to time by natural propagation.

The assertion that we cannot produce the same kind of grapes through cultivation by seed proves on trial to be false.

Therefore, if clean sound seed be selected from healthy vines, surely we may hope to meet with the identical kinds in the nursery.

Diligence and care will even here lead to beneficial results.

Digitized by Google

So discard at once the system of propagation by cuttings, layers, &c., and renew the vineyard with seedlings procured from seed of healthy stock, and we will once more possess a healthy and disease resisting vine, and also retain the sorts which are indigenous. Sick parents seldom beget fully developed offspring, therefore it is thought of the utmost importance in making new plantations to obtain the healthiest cuttings. Now we find that the most favoured mode of propagation is by the unnatural one of planting cuttings, blind vines, and layering.

It is probable that they already contain the germs of disease, and consequently before they are fully developed into a vine, are more or less weakened or powerless to resist attacks of any kind.

Even the most robust constitutions are susceptible to soil and climatic conditions, and are therefore not always durable. Take, for instance, a people of a mountainous region, and place them on a low swampy country, and how many will, for long, withstand the attacks of malarial fevers. Is this otherwise with the grape vine? Take, for instance, the Portuguese grape, which grows well, bears well, and remains healthy on high situations, but place the same in cold damp ground, and in a few years it will succumb to "Black rot," and become useless. I have now two of these sorts under observation. A gentleman in Lorraine had such success with this blue Portuguese sort on high ground that he was tempted to plant ten acres on the rich soil in the valley adjacent, but which in ten years were ruined by the "Black rot."

The Government of Grotia is quite convinced of the utter uselessness of rooting the vines out, and have determined to try experiments in an infested vineyard, at the cost of the State, its object being to destroy the pest without injuring the vines.

An additional statement of the same import comes from Switzerland, where conditions of the phylloxera infection are similar to the German.

There, out of 2,206,000 vines, 2,116, or 1 per thousand were found infected, 83,470 were destroyed, and yet the following year new colonies were discovered, even in places where for the last fourteen years a ruthless war had been waged against the pest with bi-sulphide of carbon, and yet to-day the insect is more numerous than ever.

The above and many other recorded facts point to the same conclusion, viz.:—That the pest may be held in check for a time, but never wholly eradicated.

Insect, Fungoid, and other Pests which attack Vineyards.

JAMES BEATTIE, Wagga Wagga.

In respect to drawbacks to the pursuit of viticulture the Wagga Wagg district has been more fortunate than many other wine-producing centres. The dreaded *Phylloxera vastatrix* has, in no single instance, made its appearance there. The fungoid growth, known as the *oïdium*, has not given much trouble, owing to the dryness of the climate, and, possibly, to some extent, to the nature of the soil and situation of most of the vineyards. The only vineyards, to my knowledge, attacked by it, were those in low-lying situations, and with a heavy, rich soil. One of these was attacked rather severely some years ago, but the evil was remedied by a persistent course of treatment with sulphur, combined with the uprooting of the vines

Digitized by Google

in the lowest portions of the vineyard. It is now quite free from the disease, and the Brooklyn Vineyard (though within a mile of the other) has never been visited by the pest at all.*

A strange and unwelcome visitor, in the shape of a small fly, not unlike the midge, seen in swarms after summer rain—made its appearance last season in some parts of the district. These, too, were chiefly situated in low-lying localities, the Brooklyn Vineyard, which is on a slope, being almost free from it. Other districts, particularly those on the coast, were subjected to its depredations; and the excessive rainfall, during the fruit season, accounts, in my opinion, for its appearance. It attacked apricots, peaches, plums, and other soft fruits, as well as grapes. Its method was to settle, in myriads, on a single tree, or vine, and only leave it for the next, when it had extracted all the nourishment to be obtained from it. As a consequence, its ravages were kept within narrow limits, as a specific was found for it in the shape of a solution of carbolic soap mixed with tobacco juice, which, though destroying the crop (and that the fly would have done if left undisturbed) killed the fly before it had time to do much damage.

From other insects of a destructive character, the vineyards in the Wagga Wagga district have been comparatively free. Caterpillars have never appeared in large numbers, and in the wettest seasons have been easy to cope with. An insect locally called a "bug," is a regular visitor, though not in great numbers. It visits the bunches of grapes, when half-sized, and remains till the end of the season. As it never in any way injures the fruit, I take its visits to be of a friendly nature. The only objection to its presence lies in the chance of finding it under one's tooth in eating the fruit. Once tasted, the flavour of the grape bug is not readily forgotten.

Of the birds which feed on grapes, the most troublesome are the leather head, the soldier bird, and a grayish blue bird, about the size of a parrot, called locally the "blue bird." Of these, the most destructive, and most difficult to cope with, is the leather head. It is sly in its mode of attack, alighting on the ground, and then making its way up into the heart of the vine, where, if undisturbed, it will remain for hours, destroying far more than it eats, though it is a voracious feeder.

Pests and their Cure.

G. H. WILLIS, Corowa.

A PEST that troubles us but not to a large extent, and one that is not hard to get rid of, is what is known as the sand-lark, a bird about the size of a swallow, having a long sharp bill, with which it pierces the earliest and sweetest varieties of grapes, especially the tokay. They burrow holes in the sand and there make their nests. I have not heard them complained much of on clay-lands. To get rid of them where children abound is an easy matter, the nests are easily got at and youngsters as a rule are very fond of robbing them. The next pest I would mention is a fungus, the *Oïdium Tuckeri;* if left alone it very soon destroys the vintage for the year, and if allowed to get on the berries at all it will destroy the beauty of the fruit. Some vineyards are much more liable to this disease than others, especially those formed in sandy localities, and never those with clay soils.

* The insect here referred to is probably a small plant-bug, identified by Mr. Olliff as belonging to the genus *Rhyparochromus* (family Lygœidæ), which has been very abundant in many localities in Victoria and New South Wales during the past season.

Digitized by Google

My vineyard is of a sandy nature, and consequently I have always to be on the watch, from the time of the vine shooting forth its first buds till the ripening of the fruit. In warm muggy weather I am always sure to find the first indications of it in the same spots as in previous years. If these *spots* are left for a couple of days during the muggy weather the pest will spread considerably, and if left for a week the crop will be destroyed. The best, cheapest, and simplest plan yet known for eradicating the *Oïdium Tuckeri* is to put sulphur—the finest obtainable—on the vines by means of sulphur bellows or dusting tubes. An active man can dress between three and four thousand vines a day, and perhaps more. I think it is a good plan to give all vineyards a dressing of sulphur (whether the *oïdium* shows or not) when the first shoots are about three inches long, for if not required for the disease it acts as a purifier if not as a stimulant to the vines. I think it is useless to sulphur for *oïdium* when the weather is too cold, for apparently the sulphur does not act then. It is a great mistake to do so when the weather is too hot as the vine is liable to be burnt too much. I have found hot dry days clear *oïdium* off altogether, and that the best time to sulphur is when the thermometer stands at between 80 and 90 degrees. I have found some varieties of vines, notably the Reisling, are more liable to the pest than others, while those of the *Aucorat*, growing immediately alongside, are not subject to it. Another pest is a small whitish fly, about the size of a midge, which does not trouble us every year, but only occasionally, and then sometimes in swarms. It was very troublesome last year, attacking peaches, apricots, plums, and tomatoes. Seen under the microscope the fly has a long sharp spear with which it pierces the fruit and sucks the juice. As this pest was very bad this last season on the Victorian side of the river, the Victorian Government sent up an expert who found that benzine diluted with water and put on with a spray pump would kill them and not affect the colour of the fruit. But at a cost of three pence or four pence per vine it can be of no practical value, as after killing the fly the benzine rapidly evaporates and leaves the vine subject to attack as before.

The latter clause of this question is:—"The best means, legislative or otherwise, of keeping pests in subjection," You will all agree with me that the phylloxera, having caused vast destruction in France and other wine-producing countries of Europe, is the very worst pest that has been introduced into Australia. We are sorry to learn that the phylloxera has been discovered in a fresh place. It is much to be regretted that the Government were unable to tackle the pest some three or four years ago when it first showed itself at Camden, for it is possible that it may have very widely spread through this neglect. It may be news to some of you to learn that, immediately on the disease being discovered in Camden, the Victorian Government quarantined this colony. At that time the border vignerons used to send into Victoria a considerable quantity of grapes, both for wine-making and for table use. As this prohibition was to many on our side of the river most vexatious, I, in company with the Hon. George Day, of Albury, and others interested, waited on the Minister of Victorian Customs. He told us distinctly that our errand was useless, that they had had great trouble at Geelong, that, as the New South Wales Government had assisted them in the expense, they would be quite willing to act in the same manner towards New South Wales, and that he could not understand how it was that the matter was not grappled with at once. But the fact was that legislative means were not in existence at the time to enable the Government to do so. But, although the actions of the Government are now

Digitized by Google

characterised by vigour, and strengthened by legislation, much has yet to be done, and, in my opinion, and in that of those whom I have been sent here to represent, an Act should be passed similar to that of the Pastures and Stock Act, better known as the Noxious Animals Bill. This Act provides for local supervision, which should be the most effectual means of assisting fruit-growers, as the diseases affecting one district may not trouble other districts. In the Bill above-mentioned the colony is divided into sheep districts, for which directors are elected every year, and when this is not done the Minister reserves the right to nominate them. These directors have the right to levy rates up to a given sum per head of stock, and also, with the permission of the Minister, to destroy any animals they consider noxious, and pay a fixed rate for their scalps. I would suggest that, as the local men have the best knowledge of the diseases and pests which affect their fruit and vines, that a measure be introduced at the earliest opportunity on the lines described, The colony could be divided into districts, and directors elected annually by ballot, who should be empowered to levy rates on fruit-growing property, to enter any orchard or vineyard which they believe to be affected with disease, and to get an expert (who should be appointed by the State) to make investigations. If any disease were found, this officer should have the place quarantined, and take steps, under the supervision of the local directors, to remedy the evil. I do not think there can be any reasonable ground for difference of opinion so far, but there may be in what follows. Where eradication is necessary the compensation, recommended by the local boards, or, any person the Minister may appoint for the purpose, should be paid. The work of eradication to be paid for out of the funds of the local Boards, the compensation to the owner (not to exceed two-thirds of the value) to be paid by the State, for it is fair that the owner should be at the loss of the remaining third of the value. Owners should be encouraged to give notice as to the suspected presence of any disease. If it be proved that they wilfully conceal the presence of the disease, no claims for compensation should be recognised. Such a course may seem arbitrary, but still it is the duty of every one to assist in keeping the Colony clear of pests and diseases.

In conclusion, I would suggest that the introduction of any foreign cuttings should be prohibited. We have plenty of the best varieties at present, but still it might be advisable, as phylloxera exists, to import the seeds of what are now supposed to be phylloxera-resisting varieties. Such seeds could be thoroughly cleaned in America, and perhaps fumigated on arrival. These seeds could be grown on the experimental farms and tested. With reference to uprooting vines, for the purpose of eradicating phylloxera, it is considered by some of the border vignerons that it is an unnecessary, expensive, and laborious process to trench to the bottom of the roots, for they have never known shoots to spring from them. They hold that it would be sufficient to dig a square hole, about 18 inches each way, round each vine, and then remove it to a depth of 6 inches below the hollow eye, by cutting away all roots, for as no eyes are left no shoots can grow, consequently the roots left will soon rot and die, and the phylloxera will be starved to death in the course of twelve or eighteen months. I have brought this idea to the front for scientists to investigate. If the insects could get out of the ground without the stem then this plan would be useless, but if they could not the roots would in course of time die, and so the pest would be exterminated, pecuniary loss would be averted, and a great step would be made towards the solution of the phylloxera difficult.

Digitized by Google

Orchard Pests: Animal, Insect, and Fungoid, and Weeds; the best means, legislative or otherwise, of keeping them in subjection.

R. SCOBIE, M.L.A.

I SHALL endeavour to treat my subject as it has presented itself to me while engaged as a practical fruit-grower for over forty years in the Hunter River district.

As animals are the first mentioned, I shall say something of them first. The flying-fox undoubtedly occupies the first place as a fruit-destroyer all along our eastern coast-line, and for some considerable distance inland. As its operations are carried on at night, the difficulty of keeping it from the fruit, and the wearisome watching by the orchardist after a hard day's work in the heat of summer is anything but gratifying to the watcher, more especially as, after all his care, he sees much of the best of his fruit lying on the ground, pricked by the claws and gnawed by the teeth of the flying-fox. These pests operate principally on the fruit on the highest branches on which they can find it ripe; they always choose the best they can find, and knock down and destroy many times more than they eat. In the forest their food consists largely of honey (or nectar, rather) obtained from the blooms of the eucalypti; but the cup in which this honey is contained being very open, when wet weather occurs the honey becomes diluted by the rain, or is washed out, so that their supply is hard to get; they then attack the orchards in greater numbers, and under cover of the darkness caused by a clouded sky are very difficult to deal with.

By day they congregate in "camps" in uncountable numbers, hanging in large and shady trees, usually interlaced with vines, and having much undergrowth. These camps are generally situated in places somewhat inaccessible, and at long distances from populated localities. They hang by the two posterior claws, head downward, and, when at rest, wrap the wings around their bodies. A generally-received opinion is that they hang to each other like bees. As far as my observation goes, such is not the case; they hang a little apart one from another, and are snarlish when too near to each other; the only exception being that a young one clings to its mother, who can fly about with it till it can shift for itself. Their weight is such that large limbs of trees are broken off by the numbers that hang on them.

When attacked by a party of shooters they take wing, and rise above the trees they were resting on, rather out of gun-shot reach, and should the day be shady or showery they continue on the wing for a considerable length of time; but if it be a hot sunny day they quickly settle on the tree for shade. When attacked in camp by a numerous party they become alarmed, and when treated in this way are more easily driven from orchards by the sound of guns. As dusk sets in they leave their camps and go in search of food, returning by daylight next morning. Their numbers are almost incredible, but I think they are nothing like so numerous as they once were. At a distance of some miles I have seen, about fifty years ago, a dark cloud along the horizon to the east of our homestead, when they were disturbed in the daytime; and after dark they used to fly westward, in a solid phalanx of great width, for about an hour; and I have tried to count the ranks as they passed between the moon and myself, but they passed so quickly that I found the same difficulty that I find in trying to count the posts of a 9-ft. rail fence from a train going at full speed. Nothing of this kind is to be

Digitized by Google

seen there now; but they are far more destructive now than they were then in orchards, doubtless largely owing to extensive ringbarking, which has deprived them of much of their honey supply, and the clearing of brushes, where native berries, wild figs, &c., were to be found.

Methods of Destruction.

During the fruit season—from November to March or April—large numbers are shot every year in orchards and camps, still it is desirable that a more thorough, systematic destruction of them should take place. The Government have this year placed ammunition in the hands of responsible persons, so that parties might be supplied to attack the fox-camps. I do not know how the cost tallies with the number killed, but we will doubtless get an approximate idea of how much the destruction of each fox has cost by this method. Some effort has also been put forth to kill them wholesale in camp by explosives, but those who have observed them will come to the conclusion that they are too much in the open for this to succeed without great waste of power. In the first plan mentioned (the attack on camps by shooters), as usually carried out, there is a large amount of energy wasted. In most of these attacks in which I have been engaged, we have had to leave home early enough to get as far as we could travel on fair roads before daylight, and do the rest of the journey over very bad roads, or none at all, and had to give up shooting soon enough to regain a fair road before dark, and then get home late. The travelling and labour were out of all proportion to the shooting-time; and I think, if money is to be spent for killing the foxes, it would be better to give so much per pair or set of hind claws, which would be light and easily carried long distances by the party killing them, so that the killers might get their reward. The amount should be such that men could earn a fair wage, and so make it their business. They would camp near the fox-camp, and thereby save travel; they would become adepts at discovering fox-camps, by observing the flight of the foxes; they would kill great numbers and so continually pester them while here that orchardists would find great relief from the adoption of the plan I have suggested. Queensland should also be requested to take action in this matter, for the foxes travel northward along the coast in winter, as they do not like cold weather.

The fruit-consuming public—and I presume that includes nearly every man, woman, and child in our community—are much, though indirectly, concerned in the destruction of this pest, for the quantity of fruit destroyed is very large, and always of the best, and consequently the markets are barer than they should be.

The foxes generally begin on the apricots and early peaches, if they have not already attacked the loquat and American plum crops, and continue on eating nearly all sorts of fruit till the quinces are done, and should other food be scarce at the time they will attack the grape crop.

This is not the time of year to obtain specimens of them, or I would have furnished one; but most fruit-growers are, unfortunately, too familiar with their appearance. I, however, furnish a pair of claws.

All attempts to destroy flying-foxes by poisoning in orchards are to be deprecated as dangerous to consumers, as it is generally only when fruit is ripe that they visit orchards; and poisoning, were it attempted, would certainly deter many from using fruit.

It is stated by some writers that foxes drink by lapping while hanging head downward from a branch above the water. I have never seen them

Digitized by Google

practise this mode of drinking, and observers must see that but little opportunity is afforded, excepting where willows grow beside water; but I have seen hundreds skimming along the surface of a large lagoon touching the water, and apparently scooping it up, but in the darkness it was not possible to see the actual drinking. I have no doubt, however, that they were doing so, and that this is their usual method.

Other animals inimical to the interest of the fruit-grower which we have here are hares and opossums; and native bears may also be included, as I have known them to badly break down young trees while climbing up them. Fortunately, in our principal fruit-growing districts we have so far not been troubled by rabbits; and wallabies are more of a farmer's trouble, and that only in sparsely-populated districts.

Hares are very destructive to young trees by biting through and stripping off the bark upward from the bite. They are already plentiful and proportionately troublesome in some districts, and threaten to become more so; but they may be kept from injuring trees by occasionally rubbing the stems with cow manure. Fortunately, they cannot reach fruit on trees, or they would attack it, as is evidenced by the way they eat what falls to the ground.

Where orchards and bush conjoin, opossums are often very destructive to the fruit crop, frequently leaving of stone fruits nothing but the stone.

Of bird pests we have several varieties, known in our district by the names of silver-eyes, leatherheads, blue-pigeons, thrush or hen-satin, soldier-birds or yellow-beaks, and parrots (rosella and blue-mountain). Of these, with us, the silver-eyes are by far the most destructive, and leatherheads next, both making holes in ripe apricots, red plums, figs, grapes, &c., and using the sweet juice. It is not only the amount of fruit they actually injure that has to be considered, but, at least as regards the grape crop, the amount of labour that has to be expended in taking the damaged berries out of a bunch. The blue-pigeon, which is a larger bird than the leatherhead, takes the whole grape at once. The thrush or hen-satin is much like a leatherhead, though slightly smaller, has much the same habits, but is more shy, and not so numerous. The soldier-bird or yellow-beak confines itself more to the immediate locality of the bush, and is very destructive—perhaps more so than any other—to vineyards near forests. Parrots principally chew up apples, pears, and loquats. So far, we have not had enough experience of sparrows to enable me to speak of my own knowledge positively about them.

Of insect pests, in their different metamorphoses, we have the grape caterpillar (*Agarista glycine*), mottled red and white; also a large green kind; two kinds of grape grasshoppers; the boring grub in fruit-trees, three kinds; the elephant beetles (*Orthorrhinus cylindrirostris*), also borers in the larval stage; and a smaller variety even more destructive than are the larger ones; two kinds of cicadæ, large and small; two kinds of beetles, small, which attack China peaches principally; American blight and codlin moths on apple-trees; and the aphides on orange and peach trees.

The red-and-white caterpillar has been very numerous of late years, destroying whole vineyards for a season by eating up all leaves and fruit. The large green kind has not been so numerous but is of the same habits. Both kinds of grasshoppers attack the foliage almost from its first start; they hatch about the same time as the first sign of growth appears, and then spoil the young bunches till berries form, and again they nibble the

Digitized by Google

skin of the berries when ripe, making them turn into raisins in a dry time, and mould at other wetter time. They also eat pieces out of much of the tree fruit in the same way.

The boring grub or borer pierces the limbs of trees, and lives on the bark, making a cover of its dry excrement, under shelter of which it works, and when disturbed goes backward into its hole. A small variety of a dark colour has much the same habit, but generally takes advantage of some small crack or knot to afford it cover, or otherwise eats its way into the pith of the smaller branches, if there be no other way by which it can get in, such as where a piece has been broken across or cut off. The large boring grub, which works in the trunk or large limbs of old trees, apparently living on the juice of the wood operated on, changes to a very large beetle with long feelers.

The larger kinds of elephant beetles are very destructive to old vines. The grub of this beetle lives on the sap of the wood of the vine during winter. In spring it changes to the beetle form, eats its way out of the vine, then travels about and lives on the buds even before or just as they begin to show the first sign of life. Sometimes they eat a hole in the centre by inserting their trunk, but mostly eating the eye clean up. Sometimes a beetle will travel completely round a vine, eating out every eye, thereby destroying all prospect of fruit. Even after the shoots are well advanced a great many break off because of being partly or wholly eaten through. The grub is readily found when one is pruning, as often, when a little strain is put on the branch operated on, it will break in consequence of the inside wood being so much burrowed through. The smaller and even more destructive variety—more destructive because of its greater numbers and different mode of attack—has only been known to us within the last ten years or so. It makes its appearance just as the vines commence budding, having apparently come to maturity in the ground, for there is no sign of this sort having bred in the vine. It creeps up the vine stock, and simply punctures the buds with its trunk, and if not carefully taken off will spoil the crop. It is about the size of a wheat grain, sometimes larger, and of the colour of the bark, and it takes a practised eye to detect it. Both varieties can fly, but wherever this latter variety appears it spreads slowly and surely, and, notwithstanding our best care, is increasing. Hand-picking is the only remedy we know of.

The two varieties of beetle which attack the fruit, principally the China peach, are well known, and I will do no more than mention them.

The well-known cottony aphis, or American blight, is familiar to all apple-growers, the dark aphis on orange-trees to orange-growers, and peach aphis to peach-growers; and we have many varieties of scale insects all more or less injurious.

Phylloxera I take to belong to the aphis tribe. I have not seen it on the Hunter, but have at Seven Hills. There is, from its present limited spread, some hope of stamping it out by legislation and intelligent treatment, which should be applied speedily.

Codlin moths have reached us, and I understand form the subject of another paper.

We have *oïdium* on the grape-vines every year, and were it not for the use of sulphur the crop would be utterly useless.

Then there is a fungus on the fruit of the apple and pear trees which is very destructive to the crop, some of our trees being rendered by it of no more use this last year than so many gums. I have known it for about

Digitized by Google

seven years. It has been worse this past season than I have known it before. I handed a sample last Tuesday to the Director of Agriculture; so we may get some information before parting as to what it is.*

I will not enumerate further, but as opportunity offers I will endeavour to furnish the Agricultural Department with specimens of the different pests mentioned.

Now, a few words with reference to keeping fruit pests in subjection. Legislation must be used for the stamping out of phylloxera, and possibly the lessening of the flying-fox plague, but in most cases I feel that individual or united effort by those immediately interested will be preferable to depending on Government action. Government may help us to keep out new insect pests; but—phylloxera excepted—in dealing with those we have, I feel that it is only by those interested who are on the spot, and whose daily duty it is to look to their own welfare by checking and destroying these pests, that it can be efficiently and economically dealt with. The Agricultural Department can help us by systematic experiments for the destruction or mitigation of these pests by investigation, classification, exact observation and description, to enable us to recognise and intelligently deal with our troubles.

While I do not say legislation cannot help us, I say let us be careful how we adopt it, as we may bring about a grating interference of law in our affairs, and an expense which would not improve our position.

NOTE.—Mr. Scobie promised to send to the Entomologist specimens of all the insects mentioned for identification and description in the *Gazette*.

Flying-foxes and Sparrows.

W. H. M'KEOWN, Roseville, Gordon.

I AM pleased to have an opportunity, by means of this Conference, of drawing public attention to the great loss sustained yearly by fruit-growers through the "flying-fox pest." It would be difficult to estimate each season's loss over the whole Colony, but I think I may safely estimate my own at from £50 to £100 a year. This loss accrues from the fruit actually destroyed by these animals, and from the necessity of picking late apples and pears before they are properly ripened and marketable. Late peaches cannot be saved even in this unsatisfactory way, and are consequently almost a dead loss owing to the ravages of these animals. I believe the pest is increasing. In past years it was only in very dry seasons, when natural food was scarce, that fruit-growers suffered from it; now, wet or dry is alike, and we have no hope of a season passing without bringing these destructive visitors. It must be plain to anyone acquainted with the subject that, if some steps are not taken to destroy them, a stop will be put to late fruit-growing in the coast districts, and for a considerable distance inland.

* With reference to the apples and pears forwarded to the Department for examination, Dr. Cobb reports having found four fungi on them, only one of which, however, is visible to the naked eye. Although naturally the diseased condition of the fruit was supposed to be due to this visible fungus, which causes jet-black dots and spots on the skin of the fruit, so far as he has been able to see, however, this black fungus has nothing to do with the decay of the fruit. As it seems to have no power to penetrate the skin of the apple, it is comparatively harmless. He also found in the tissues of the apples and pears yeast-fungus and penicillium. These also are comparatively harmless. They enter and cause decay only when fruit is first bruised or otherwise injured. Concerning the fourth fungus he is not quite clear, but so much is certain that it consists, so far as he has yet seen, of spherical cells, which now and then present buds like yeast-cells Many hypodermal cells in the apples were packed full of this fungus. It may be the real cause of the disease affecting the two lots of fruit, but only careful, and very likely prolonged, investigation can decide this point.—EDITOR.

Digitized by Google

Means have been used by fruit-growers for keeping off the flying-fox, but for none that I know can any very great success be claimed. I have seen three lines of barbed wire stretched one over the other along a row of trees, and by this means many of the robbers have been wounded by flying against the barbs. But it would be utterly impossible to apply such a remedy in large orchards of mixed fruit. I have myself adopted the plan of tying a piece of white cloth over each tree, supplemented by a free use of powder and shot. Without the latter, scarecrows very soon fall into the familiarity which, with flying-foxes as with human beings, breeds contempt.

The difficulty of night-shooting will readily appear. Many nights are too dark for it. Were it otherwise, the fruit-grower would require a strong contingent of sharpshooters by night to protect his property, as well as labourers by day to make it worth protecting. I am afraid that the game would not prove worth the candle. In my judgment the only way to cope with the pest is to have them proclaimed noxious animals, and to tax the fruit-growers to pay for their destruction. The tax would fall lightly by comparison, and an impetus would be given to the finding and destruction of them in camps, and to night-shooting. I leave the first part of my subject with this suggestion for the thoughtful consideration of the Conference.

I have now to speak of another pest, which, although only in its infancy, is sufficient to cause alarm—viz., the sparrow. If it be not dealt with promptly I am afraid it will prove more serious than the flying-fox. In the grain and grape-growing districts it must become a difficulty only second to that of rabbits and hares. Every year will make it more difficult to cope with these birds, so rapidly are they increasing. In the old country, with its hard winters and scarcity of food, they can be easily kept in check. When a boy, I have often seen twenty or thirty killed at a shot by laying a train of oats on the snow. No such wholesome means can be used here. The little plagues become very crafty if they find you are bent on their destruction. By constant vigilance I have kept them from settling or breeding about my house, but this has proved poor ground for congratulation. About twelve months since I kept an acre of sorghum for seed. The sparrows came in flocks from the homesteads around, and, in spite of all my efforts, they took the whole of the seed. A friend of mine on the Parramatta River has been obliged to cover his vineyard with wire-netting in order to save his grapes from this pest. If they are allowed a free run in the poultry-yard, each bird will eat as much as a good-sized chicken. They also pollute the water where rain is the source of supply.

This pest can only be abated, I think, by the municipalities taking the matter in hand, and dealing with it promptly and vigorously. It will be vain to attempt anything in the districts in which they prove so destructive while they are allowed to breed without check in the centres of population.

I beg to conclude my paper with the hope that some well-considered measures may be adopted speedily to meet the dangers and losses, actual and threatened, from the two sources of which I have written.

The Codlin Moth and its habits.

By T. GRUNSELL, Goulburn.

THERE are a number of pests with which vine and fruit growers have to contend. There are flying-foxes, and a number of smaller pests too numerous to mention, and before long we shall find the sparrow to be one of the

Digitized by Google

worst. I have chosen the codlin moth for my subject, having suffered much from its ravages. Now, no one seems to know how, or where, it first made its appearance in this Colony, but it must have been imported with foreign fruit. So far as I know, nothing was known of it previous to the construction of the railroads. The railway runs through my property, and I have good reason to believe that it was brought by its means to me and to Goulburn. I had it long before I knew what it was, or how to deal with it. I could only find traces of it, but could not discover the insect, as it generally leaves the apple or pear previous to the fruit falling from the tree; but, when I discovered its hiding-place, I set to work to destroy it. But I have found that it is not to be done at once.

Now, sir, I do not know if I begin to describe it in the right way or not. I shall begin with it as the moth which about the time the tree is in blossom will flit from flower to flower, and deposit an egg in each blossom, perhaps as often as it alights. When the fruit is formed the egg will be hatched, and the insect will begin to eat its way into the fruit, at which time it can be scarcely seen by the naked eye, but may be discovered by its excrement, which is passed out of the hole by which it entered the fruit. It will continue there till grown to its full size, having eaten out the inside of the apple or pear, together with the pips; after which it will make its way out of the fruit and make for a hiding-place in some secret part of the tree, either under loose bark, or in a crevice or a hollow part of the tree. Now, as we can seldom see them on the move, I am led to believe they generally move in the night. I have seen them moving only on a damp, warm day. After the grub has found a hiding-place, it will gnaw wood or bark so as to make it fit comfortable, then spin a web, or blanket if you like, and thus secure itself from cold or any other harm, and stay there till nature changes it, into first a chrysalis or hard brown object, quite unlike its first state. After a while, how long I do not know, it changes into the winged moth, and flies away, as its parent did before, to lay eggs, &c. It is now some four or five years since I first commenced to destroy this pest, but not till it had destroyed 90 per cent. of my crop. The next year I succeeded in saving about 50 per cent.; the next, 75, or thereabout. But, owing to my absence from home last year, I have this season again to lament the loss of nearly or quite 90 per cent. of my fruit. My mode of procedure is this: I bind round each tree bands of stringy-bark (old clothes will do as well); if no loose bark or hollow place be on or in the tree, they will hide under the bands, and thus be trapped. The bands should be examined from time to time during the summer, or the early ones will be changed and gone on the wing. This, in a warm climate like that near Sydney, may continue all the year round; but if no fruit be on the tree, of course they will perish. I find they can stand a good deal of exposure, as several of my trees have this year been inundated by flood water, and only in two cases, where the water had stayed a long time, were they dead.

Another instance of their hardiness: I poured kerosene on one, and shut him up in a box, and six hours after he was still alive.

Now, seeing that fruit-growing is likely to become an important industry in the Colony, we think it necessary that better protection should be afforded to fruit-growers, and that an Act of Parliament be passed so as to compel all who have trees to give proper attention to them, or have the said trees destroyed. Why should we not be protected as well as the squatter whose sheep or cattle are in danger of disease? As far as Goulburn is concerned, I fear it is almost too late; and I am informed that Yass, Gunning, Queanbeyan, and Crookwell are nearly as bad.

Digitized by Google

I trust that this meeting will be the means of stirring those in authority into action, and that some steps will be taken to thoroughly eradicate the pest. I believe if action had been taken long ago it might have been stamped out before this. I fear that the thing was kept secret by some, fearing that an exposure might somewhat affect their trade, as some years ago I first made the discovery near Sydney, and in one case when I showed it to the proprietor of an orchard he denied the charge.

Best Treatment for Destroying Codlin Moths,

Being a letter from MR. J. H. DICKENSON, of South Bridgewater, Tasmania, brought under notice by Mr. J. HOPKINS, Sydney.

WE have had the codlin moth in our orchard for some ten years, and have been fairly successful in keeping it under, considering that some of our neighbours have not done anything towards its destruction. The habits, &c., of the pest, and the means whereby it may be best destroyed, have been a matter for urgent consideration from the first. In this place the first grubs are hatched about the middle of December, and immediately commence eating their way into the pips, and, when fully grown, eating their way out in another direction. They then lower themselves down by a thin thread to the ground, or to the first limb in their way, and then crawl about until they find a harbour. If they should be on the ground they generally make for the tree, and crawl up it until they find a place suitable for winter quarters. They are also very fond of such harbouring places as old paling fences if near the trees, or in any rubbish on the ground. In the tree they seek harbour in any cracks or rotten places, such as where a limb has been cut off and gradually cracked and decayed. In these places they spin a cocoon, and remain in the grub state all winter till just before they come out as moths, when they turn into the chrysalis form. The moth lays her eggs in the eye of the apple in the first part of the season, but later hatched ones lay their eggs on the side of the apple as well as in the eye. For some time it was a disputed question here as to whether there were more broods than one in the season. Mr. Watson, of Providence Valley, was the first to distinctly aver there was only one. I tested the matter myself in this way—by collecting a lot of the first hatched grubs in their harbours and putting them in a large glass bottle, tying muslin over the mouth of it. None of these changed into chrysalis form till just before they hatched into moths. The next season also bandages left on the trees untouched till end of season had all the cocoons with grubs in, which would not have been the case if there were two broods. In our first legislation in this Colony *re* this pest, the orchardists were put to unnecessary trouble in removing the bandages and killing the grubs once every fortnight. I was one of the first to object to this as unnecessary labour, and brought it before the Glenorchy Codlin Moth Board, of which I am a member. Naturally it was asked, how is it some moths come out early in and some towards close of season? I met this by telling them that when quite a boy I exhibited silkworms at the Horticultural Show here in all stages, from the eggs to the moth laying eggs. This I was enabled to do by retarding the hatching of some of the eggs, and placing those I wished to keep as eggs down in a cold dark cellar. Now, I believe this accounts for varied times the moth comes out, as I find that grubs just under a scale of bark on the sunny side were turning into chrysalis form, while grubs in shady places and in rotten places in the trees were showing no sign of changing.

Digitized by Google

Well, now, as to means used here for its destruction. These are spraying the trees, bandages, picking all infected fruit, and during the winter months cleaning out all possible harbour in the trees by scraping off loose bark, cleaning moss of old trees, and filling up all cracks and rotten places with pitch or some other substitute.

First re *Spraying*.—Paris green and London purple have been used, but not with very satisfactory results; Spawn's mixture has been used also, giving better results than the others mentioned, but still the spraying only reaches the first hatching, as by the time the later hatched moths lay their eggs the rain has cleaned the apples, and these mixtures can only be used in the first part of the season.

Bandages.—These are put round the trunk of the tree and fastened either with thin wire nail or by tying, and are of some woven material, and at least 4 inches wide when doubled. This season we have used thick brown paper (such as paper that is used for newspaper wrappers) and have found it very satisfactory. The bandages are put on before 1st of December, and we do not remove them till the end of June. When a tree is forked close to the ground and we cannot bandage it so, we fold the paper up and fasten it in the fork.

Picking Infected Fruit.—We go regularly over the trees during fruit season and pick off all infected fruit we can see, putting them into lined baskets, and from these, as soon as nearly full, into good sound grain sacks, tying them up tightly. Then if the grubs come out of the apples they start and spin their cocoons on inside of sack. These we cart up and stack on some old timber in a clear space in yard, so that if any get out of bags they go into the old timber, which is burnt at the end of the season. By this system it saves the trouble of boiling down the apples collected every day, as you can leave them till there is a good quantity, and then take a day and boil the lot. This is done in a large pot close to the stack, immersing the bags for a few minutes as emptied, and then hanging them up to dry for further use. When the bags are opened a great many grubs in their cocoons will be found in the inside of them.

During the winter months all loose bark and moss should be scraped off the trees, and places starting to decay cleaned out and filled with pitch or some substitute, while all rubbish about the orchard should be cleaned up, and this, with the scrapings, burnt. A large number of poultry kept in the orchard do a great amount of good.

All cases and baskets that have been used should be scalded at the end of the season before they are put away.

Insect and Fungoid Pests and Weeds: The most successful Methods of eradicating them.

E. H. ACRES, Heywood, Baulkham Hills.

I DESIRE to make a few observations on subject No. 4, "Pests—Animal, Insect, Fungoid, and Weeds: The best means, legislative or otherwise, of keeping them in subjection."

No doubt the many insect pests to which the citrus kinds of fruit-trees are subject have been and still are a cause of great trouble to growers, many

Digitized by Google

f whom have tried various remedies with more or less success, while others .o not trouble themselves much about it. I say insect pests only, because nimal and fungoid pests trouble the growers in a much less degree—in fact, he only animals to deal with are hares, now included in the Noxious Animals ict which has proved effective in keeping them under in this district so far —and I think fungoids can be dealt with at the same time and by the same reatment as for the insect pests, that is to say, as far as I know the same reatment will do for both; insect pests are no doubt the great trouble to rchardists in this district as they have been to orchardists in California, Florida, and others of the American States where great attention has been aid to the subject by their Agricultural Colleges, and the best results there ittained appear to have been derived from the application of kerosene emul- ions, although those emulsions have not, I think, been so successful in California as they have been in Florida, probably because of the drier climate in California. I have tried various remedies, viz., kerosene and water—1 of oil to 16 of water—syringed on cold, which kills insect pests, but I thought the oil stopped the pores of the leaves, and so somewhat injured the trees; I have also tried tobacco with sulphur, lime, and other remedies, but after experimenting for years I find that a mixture composed of soft soap—made with whale oil—blue oil, and sulphur is the best: sulphur and soap boiled together, oil added after, and syringed on to the trees at a temperature of from 140° to 145° Fahrenheit; if done during dry weather the trees should be syringed with cold water half an hour before using the mixture, so that the latter will adhere or be the more readily absorbed. I find that this mixture, put on properly, will destroy red and white scales, elephant beetle or borer, and all insect pests that I have had to deal with. If trees are badly affected they should be dressed in November, and again in early autumn. Scales multiply faster during autumn than any other time of the year. Up to the present time there is no one remedy generally adopted, each orchardist using the remedy he thinks most effectual. Now, as at least some of these pests fly from orchard to orchard the matter will require to be taken in hand by our Agricultural Department, who, I think, should appoint an inspector for each district, whose duty it would be to inspect all orchards therein and see that owners used every effort to destroy all insect pests as much as possible, and after one year if remedies have not been applied fairly successfully, the owner should be fined, if no better next year, the penalty to be increased, so that the owner would find it cheaper to destroy the pests than to pay the penalty. At the same time, as many of the pests are spread far and wide throughout the Colony, we cannot expect to quite stamp them out, but we can nearly do so, and with great benefit to growers and to the Colony, as we have now come to that stage in the growth of citrus fruits to make it necessary for growers to look to other than Colonial markets for sale of their fruits, and it will never do to put scaly or diseased fruits on the European markets. I may add that both red and white scales appear to me to attack all varieties of the citrus kinds alike, and in all situations. With regard to the treatment of weeds in orchards, which I understand to mean the cultivation of orchard land, I think the best way is to move the soil, not deeper than two or three inches, and as often as necessary to keep the weeds down, the loose earth, in fact, to act as mulching over the whole surface; in this way roots and fibres are disturbed but little, if at all, and the open surface will readily absorb rainfall. I find that it is injurious to the trees to work the soil deep, at all events it is so in the shallow soils of this district.

Digitized by Google

Red Scale on the Citrus Tribe: How it may be easily and inexpensively removed.

THE following paper was sent in by Mr. J. Patterson, Tamworth, and wa read by the Director of Agriculture:—

I have had occasion to use many insecticides for removal of red scale fro orange and lemon trees, and I find that the simplest and most effectual i starch. It is prepared in the following way: 2 lb. of the ordinary housekeep starch are dissolved in a little cold water, then about 2 quarts of boiling water are poured over the starch solution, and stirred until it is thoroughly mixed. Add to this 16 gal. of cold water and stir well. The insecticide is now prepared and ready to be applied to the trees.

The insecticide should be applied with a syringe when the trees are small or with a spray pump, when the trees are large, and it will cause the following result: The foliage and fruit receive a coating of the starch solution, which adheres to the foliage and fruit, and smothers the scale, and in a few days it will come off in flakes, bringing with it the scale, leaving the foliage and fruit as bright and clean as if the trees and fruit had never been infected with scale.

The insecticide should be applied during sunshine, so that it may dry quickly, and adhere to the foliage and fruit, and carry out its destructive work as intended.

After the trees have been thoroughly treated with the insecticide they should receive top-dressing of stable manure to be dug in the following season, and the cultivator will find that his trees will produce large crops of superior fruit, and will repay him for the labour expended on them.

Pests.

C. BRADBURY, Melbourne.

A Fly Pest on Vines.

THIS insect lately made its appearance in the Rutherglen district (Victoria) in immense swarms, and did great damage to the grapes when nearly ripe.* There has been much difference of opinion as to its character. It was thought by some vine-growers to be similar to the Californian "thrips," but this is not the case, for it belongs to an entirely different order. "Thrips" feeds like all the insects of that order, by means of *mandibles*. The "fly pest" is a bug, and feeds by means of a piercer or long sucker, as the mosquito; it generally attacks the stems of the fruit, and conceals itself in the branches during the day, and in very hot weather it goes into the ground near the roots of the vine; on being disturbed it comes out and rapidly takes wing. It is very active in its movements, and flies upon the least alarm. During the visitation at Rutherglen I was invited to visit the district, which I did, in company with the Inspector of Vines and other Victorian officials. The damage done was enormous. In some vineyards half the crop was destroyed, and one gentleman represented his loss at several hundreds of pounds sterling. I carefully examined the vines and found every one of them, over a very large area, literally swarming. The juice of

* Evidently the insect mentioned in the foot-note on page 113.

Digitized by Google

the grape had been sucked out, and the grapes hung in clusters of a dark-brown colour, shrivelled up, the leaves turned brown also, and when a branch was touched the insects rose in clouds and scattered about.

Mr. French, the Government entomologist of Victoria, tried a large number of remedies without any effect until he tried benzole, which killed them almost instantaneously, but the difficulty was its application, as it will not mix with water. Quibell's insect destroyer was also very effective in destroying the flies. I tried Quibell's insect destroyer, which has similar properties, with the advantage that it is soluble in water, and easily used with a spray-pump. We made a large number of experiments with success, upon the insects on different kinds of fruit. In the destruction of this pest it is desirable to begin directly it makes its appearance, and by using a fine spray-pump, do not disturb the insects or touch the vine. Commence spraying over the top of the vine, the spray brings the insects down as they rise, and their escape is prevented. I found the insect upon all kinds of fruit, the plums lay on the ground in bushels, withered and dried up, where large crops had been gathered the previous year. They attack tomatoes, flax, maize, and even capsicum, but only one kind at a time. In a vineyard they appear to acquire a taste for one kind of grape and leave the others; at other places they attacked the plums and had left the vines untouched.

Oïdium.

This is a fungoid parasite; it affects the grape by inserting spawn threads in the pores or organs of respiration, and spreading mycelium over the fruit or leaves. It appears in the spring on the earliest leaves and is rapidly propagated. The leaves, when affected, become pale and withered. *Oïdium* is a serious enemy to the vine-grower. Flowers of sulphur and ground sulphur are well-known remedies, but I doubt if it kills the *oïdium*, as I have made various experiments which lead me to doubt its efficacy as a destroyer of the germs. I think the sulphur only fills the pores or organs of respiration, doing to a lesser degree what the *oïdium* does, and prevents the *oïdium* from inserting its spawn threads. I have found dust and other earthy substances have the same effect, but after a shower of rain or heavy dew the *oïdium* would reappear. This would show that the germ is not killed. Spraying with Quibell's insect destroyer has proved very effective.

Locust or Grasshopper.

As this insect has made attacks in various parts of Australia with deplorable effect, it is desirable that the matter should be brought before this conference. I will not dwell upon details of common knowledge, such as a description of the insect, its mode of attack, the extent of damage done, or the extent of the swarms, but shall indicate how to prevent the damage and destroy the swarms most effectively. The eggs of the grasshopper are deposited in holes in the ground, which are made by the females with their tails. After making a hole of sufficient depth, the eggs are laid in February or March, and in colonies very close together—200 to 250 holes to the square-foot, and about 10,000 eggs in that space. In spring the eggs are hatched and the colony is a moving mass of little insects—they hop, but cannot fly. This is the time to attack them, and by unity of action a great amount of good may be done. A powerful spray-pump would prove most efficacious and destroy them wholesale. In America they harrow-up the eggs, but this is only partially effective, as many eggs still remain beneath the surface, and are hatched in due course. They have also a method of running a shallow

Digitized by Google

trough containing tar or paraffin which is drawn along the ground, and into which the insects jump in their efforts to escape. The leaves of the castor oil plant are very poisonous to grasshoppers, so also is the common larkspur, which might be freely sown in places liable to the visitation.

The PRESIDENT: I think we may now discuss this subject, which is one of extreme importance. We have had papers upon wine production, urging the necessity for careful selection of plants, and of the ground in which they were to be grown. This is all very well; but unless we take precautions to prevent the ravages which other countries suffer from pests, some of which are little known here, I fear that all the good we can derive from these papers will avail us little. It is difficult to predict the ultimate mischief resulting from any of the pests or diseases which may affect our crops. If they are allowed to continue unnoticed very soon a whole district will be affected, and the commerce of the country thereby seriously suffer. Let me give you an instance of what I mean. So rapid was the progress of phylloxera in the south of France that it is said the original point of infection spread in six years over an area of 74,100 acres; and in ten years it had covered 37,050,000 acres. The average production of wine, as a consequence, had been decreased by 440,000,000 gallons, representing a loss of £40,000,000. I have a few statistics before me, showing the Continental and Transatlantic trade in wine, and I have no doubt they will be full of interest to you. In 1887 the value of wine imported into France amounted to £18,187,083, whereas ten years before it only amounted to £1,229,166. The amount imported during 1887 into United Kingdom amounted to £5,466,266; Germany, £1,604,500; Russia, about £617,000; Switzerland, £968,791; Belgium, £887,416; Holland, £552,666. The wine exported from France in 1887 was valued at £9,738,625, or £8,748,458 less than the value of that imported. From what we can gather, it seems not unlikely that a similar state of affairs will be brought about in Spain. The British Consul there has reported that through phylloxera and mildew the planters will be obliged to cut down their vines in order to save them; and that, even if the vines should survive and grow again, there will be no fruit for three years. In other districts the vineyards are totally destroyed through mildew, for the plants are without grapes or shoots; and as the application of copper has been found useless, there is a terrible consternation amongst proprietors and labourers; in fact, owners of superior wines will not sell. In other districts vines looking healthy and flourishing suddenly assumed yellow spots, and young branches and grapes fell off. Wine which brought 12s. for 250 lb. rose to 19s. for the same quantity. From most of the productive districts it is anticipated that not a bottle of wine will be forthcoming. The British Consul, in Spain, finishes his report with these remarks:—"This year's loss will be more felt by the unfortunate growers, as they could have obtained exorbitant and almost fabulous prices for their wines in the markets of France on account of the latter's quarrel with Italy, and there being no treaty between the two countries. As far down as Denia, the great market for raisins, this calamity is felt, as it is feared there will not be a single raisin for exportation. This will most seriously affect the shipping interests of this coast, and depress freights to a considerable extent, and vessels will most probably have to leave in ballast, or proceed to the ore ports. At a recent meeting of growers, after much debate, it was almost universally decided that the vines would have to be nearly all uprooted, or, in any case, very much cut down. In the former event this would mean a serious loss of time,

Digitized by Google

as three years must elapse before the vines could grow grapes, and in the latter at least a year must pass, and prices would be very much influenced, for even now wine is going up. Great quantities of sulphate of copper have been used to stay the ravages of this deplorable disease, but in vain, as the remedy was applied too late; and, besides, not only is the unfortunate vine attacked by mildew, but is also exposed to the ravages of four other phases of destruction well known to all acquainted with vine-growing." Again, let us look to Switzerland, and we find that the same has been the case; almost three-fourths of the vineyards have been made useless through phylloxera. Even in ancient Palestine the vineyards, of which we have so often read, have been terribly devastated. Sicily, which helped France in her difficulties, and for this reason uprooted olive groves and other cultivation, has now to earnestly work at preventing the spread of peronospora and phylloxera, which have reduced the wine commerce of Sicily in some districts to the lowest ebb. The United States has had to fight hard with the cottony cushion scale and the fluted scale on the oranges; the devastation resulting from the disease called peach yellows has been terrible. Whole orchards throughout large commercial districts have been totally destroyed, and trees, whether healthy or unhealthy, have not been able to withstand it, the only hope of salvation being the total uprooting of the trees. With regard to the codlin moth in Tasmania the loss was, in 1886, from 100 to 400 bushels in each orchard; in 1887, from 35 to 100 bushels; through the introduction of the Insect Bill the loss in 1888 was comparatively small. Apples in the United States are not only attacked by the codlin moth, which in some counties has threatened to destroy the whole crop, but blights, scabs, and a species of worm (which causes the fruit to fall off), have been exceedingly prevalent. I mention these facts in order to demonstrate the importance of the question the Conference is now dealing with. In the speech I made at the opening of the Conference, I referred to a worm which has recently been discovered in this Colony, and which seems likely to work great havoc among the crops. Some time ago, I am informed, certain farmers at Glen Innes imported beet-root seed, and it seems to me not at all improbable that the worm to which I refer was introduced in this way. At any rate it was never previously recognised in the Colony. You will agree with me when I say that it is vitally essential we should discover some means of preventing the spread of the pests through the country, and I shall welcome any suggestions you may make on the subject. The time has arrived, I quite admit, when we must legislate for this matter. I believe that nearly all the pests in this Colony, at the present time, have been introduced in imported fruit, and it is to be regretted that long ago we did not follow our neighbours' example and introduce a bill to enable us to inspect all imported fruit, and to reject and destroy that which was found to be infected. The Government intend to deal with the subject this Session, and a bill in the desired direction has already been prepared. We fully recognise its gravity, and the suggestions which may be offered during the course of this discussion will be of great help to us.

The DIRECTOR, before the discussion was proceeded with, announced that Mr. B. Culley had intimated to him that he believed he had discovered a cure for phylloxera. The unfortunate part of it was that Mr. Culley's was only a theoretical cure, for he had never seen the disease. He wished the Conference, prior to considering the matter, to allow it to go before a Committee, which, with their consent, might comprise Dr. Fiaschi, Mr. Whitaker, Mr. Frere, Mr. Lankester, with Mr. Olliff and himself as representing the Department.

The Conference signified its approval of the suggestion.

Digitized by Google

The DIRECTOR then intimated to the Conference that the gardener at Rookwood had some American varieties of vines, cuttings from which he would be happy to furnish any vine-grower with as stocks for other vines. It had been asserted that these varieties were not injured by the phylloxera pest. The Director also stated that the Department was preparing a collection of insects, friendly and otherwise. He would be glad if any delegate would send specimens for identification, and referred to the specimens exhibited by Mr. Olliff.

The Conference having decided to discuss the question of phylloxera separately,

Mr. MACWILLIAM, Corowa, opened the debate upon pests generally. He said that there was a small pest of which no mention had been made, but which had been prevalent in the Murray district this year. He had lost a number of young trees through it. The insect, he believed, resembled the Jordan louse. A friend advised him to strip the trees down to the main roots, and to watch the stems carefully. He followed out the suggestion, and soon found out what it was that was killing the trees. The little insects came out in thousands. He made inquiries in order to find out a remedy. He tried 3 oz. of sugar of lead, dissolved and mixed with a gallon of strong whitewash (ordinary lime and water), and, with this mixture, he painted the stems of the trees, and the pest was eradicated. If he had not adopted this course he felt convinced he would have lost his vineyard. Mention had been made of the sparrow pest. His experience was that oats, poisoned with arsenic dissolved in vinegar, and scattered some little distance away from the house, killed the birds wholesale. His method of sulphuring vines was a simple one. He cut up a coarse bag into several pieces, made smaller bags of these, put sulphur therein, and then shook them over the vines. The first dusting was given when the vine-buds began to appear, and then, according to the weather, he repeated the application in about a fortnight's time. By this method, from 8 to 10 acres of trees could be treated per day, and, though it might require more sulphur than other methods, it would, in the end, be more beneficial. For several seasons he had suffered from the grasshopper pest, and his method of getting rid of them was to lay down loose straw as the insects were just emerging from the ground, and were no bigger than house flies. He set fire to the straw, and thus destroyed them by millions.

Mr. CULLEY, Urana, mentioned a simple means of destroying grasshoppers, which had been found to work effectively at Urana. One year, he said, the plague took every leaf from his orchard. After watching the habits of the insect, he observed that rough ground seemed to be repugnant to it, and so next season, when they seemed to be even more abundant, he had the ground very roughly hoed, the consequence being that he never lost a leaf during that season. There was one night in the year (known as flight night) when, if they could secure a safe place and light a great fire, the insects would be attracted to it, and die in myriads.

Mr. GELDING, Sydney, said he had suffered greatly from pests for several years. Grasshoppers, they well knew, in their flight settled upon a strip of country, and utterly devastated it. Their course was in a long line, and every leaf in the path was eaten up, and if the bark of the trees was tender they ate that also. In America, where the plague was most severe, the people met it by digging a wide trench across the line of flight, and by using gas-tar. This remedy, he thought, might well be tried here. Peach-tree blight has been referred to as a serious pest. He believed that at the end of the season the female insect laid its eggs in the scales of the buds, and with the spring

Digitized by Google

time they were hatched, and soon the trees were covered with the pest. If prompt steps were not taken to destroy the blight the trees would be crippled for the season. A remedy he advocated was to keep the trees warm, and to paint the trees in the winter with a composition of lime and sulphur. This prevented the birth of the aphis in the early spring. Where a tree was badly affected, every bud should be brushed with an emulsion. For the woolly aphis pest he had heard that some gentleman on the Western line had discovered a sure remedy. Many nostrums were recommended for this pest, including kerosene emulsion. In the old country, in his younger days, a simple remedy was used. Clay was mixed with water to a fair consistency, and applied with a stiff brush to all the knobs which appeared on the tree. This was found to answer better than any of the expensive compounds now advocated, and he still used it. If they desired to keep these pests in subjection they must be constantly warring against them. No possible legislation could keep the insects from their crops if they did not apply individual efforts. The scale on orange-trees, he believed, was a disease which attacked those particularly prone to disease. A thoroughly healthy tree, planted in good soil, would be exempt from it, but immediately there was the least sign of disease in the tree the pest would appear. The Agricultural Department, he believed, would be fulfilling a useful purpose if it tutored growers to be self-dependent, and taught each to do his best to combat these evils.

Mr. LANSDOWNE, Goulburn, said that they were subject to a great many pests in the Goulburn districts. He had brought specimens of a species of scale for examination, which had done a great deal of harm to apple-trees. The codlin moth was very prevalent in some of the old orchards. It was rapidly spreading, and great difficulty was experienced in coping with it. They much needed legislation to assist them. Several petitions have been sent through the Central Association, asking Parliament, during the present Session, to pass a Bill which would compel everyone to take steps to eradicate the pest. Under the existing state of affairs it was found that while one grower kept his garden free from disease and weeds, others around him took no interest whatever in their orchards; they utterly neglected them, and as a result pests multiplied to the great detriment of the careful growers. Their peach-trees were subject to aphis, and to another blight which curled up the young leaves. In his own orchard he had seen trees break into leaf, and in a week or two they appeared to be dead. He had tried spraying with kerosene and with soapsuds, and had, by this means, succeeded in destroying the blight. They also suffered from a blight which attacked cabbages. It took the form of a small fly, which laid an egg that soon changed into a caterpillar, very difficult to detect, because it was of the same colour as the leaf. He had tried several remedies for this, including sulphuring; but the most successful treatment was to keep the plants healthy, and in as good growth as possible. It was of no use trying to cope with the disease if the ground was not in good condition. Where a whole bed was infested the best thing to do was to set fire to a quantity of rubbish to the windward, and to throw sulphur upon the flames. The fumes were thus carried over the infected area, and the insects would drop to the ground. Sprinkling with quick-lime was also beneficial. With regard to entrapping the codlin moth, he believed that it was the most effective. The borer was another pest from which they suffered badly. He had succeeded in killing the insect by scraping away the excrement it deposited on the tree, and applying a little turpentine to the holes. They had also suffered from the caterpillars, but much more from grasshoppers. The former pest he had killed off by rough

Digitized by Google

ploughing and furrowing the land. These were simple remedies which he had mentioned, and if other delegates would similarly give their experience they would soon find some way of keeping pests in check.

Mr. CLEGHORN, Uralla, said that during recent years the pest they had suffered most from was the birds. They committed great havoc among the cherries and pears. They were most persistent, and utterly indifferent to all attempts to drive them away. He would be glad to hear of some better way of destroying the birds than by shooting them. He was also anxious to hear something more about the woolly aphis, for it was one of the worst apple blights they had to deal with. He had succeeded in keeping it under with applications of Gishurst's compound, but this was an expensive process. For the future he would try the remedy mentioned by Mr. Gelding. After a tree had recovered its vigour, the woolly aphis disappeared, and the tree bore as freely as before. It occurred to him that if the entomologist of the department could inform the growers of the constitutional difference between a tree liable to blight and one which is not, he would be doing them invaluable service. It seemed to him that the one must be deficient in something which the other possessed. If this difference could be ascertained, and the blight grappled with on that basis, they would soon be able to eradicate all diseases. The borer, which had been referred to, did great injury to cherry-trees. Wherever he saw gum exuding from the tree he blocked up the hole with soap. This excluded the air, and seemed to kill the grub inside.

Mr. J. MILLER, Tenterfield, said that the American blight or woolly aphis, as it had been called, had affected his trees severely for some years past. He had grafted American blight-proof varieties, and in this way succeeded, in a degree, in exterminating the disease; but the portion of the tree below the junction was still subject to it. The application of different specifics stayed the pests only for a short time, and the best mode of treatment was to wash the tree well with soapsuds, and then to apply a mixture of boiled oil and sulphur. This paint stayed the blight for fully six months in the year. Many varieties of trees were more or less blight-proof, and by grafting such on thoroughly blight-proof stock the trees were kept almost clean. In this way he had succeeded in cultivating some twenty different kinds of apples; whereas, from the old stock, he could only cultivate two or three.

Mr. J. HAYES, Singleton, said that, like some of the previous speakers, he was disappointed in hearing no mention made of some of the worst diseases and pests which attacked some of our fruit-trees and vines. For instance, no reference had been made to black spot on the grape, a disease which caused much destruction, especially to white grapes. Little had been said also of the peach aphis or red scale on the orange-trees. He quite agreed with what Mr. Scobie had said as to the immense damage caused by flying foxes, an evil upon which too much stress could not be laid. This animal attacked all kinds of fruits. Last year they actually pounced upon the grapes and devoured them. He was rather astonished that so little advantage had been taken of the offer which the Government had made to supply ammunition to shooting parties, organised for the purpose of destroying foxes. If attacked in their camps he thought they could be greatly thinned. Mr. Scobie had mentioned the damage which hares did to young trees. He had tried the remedy suggested, namely, painting the trees with cow-manure; but he added a little lime, with excellent results. A neighbour of his some time ago planted a number of young orange-trees, and in one night the hares ate down forty of them. If the remedy he mentioned had been applied no damage would have been done. Among the bird pests the leatherhead was the most destructive in his neighbourhood. Three or four hundred of them

Digitized by Google

were shot in his vineyard during the last season. He did not altogether agree with those who would rely upon legislation for the destruction of these pests. A more preferable way was to form societies in the different localities, who might offer bonuses. He might mention, with regard to the woolly aphis, that for years he had been growing some twenty or thirty different kinds of apple-trees without having seen a sign of this disease. He had seen on his peach-trees traces of what he believed to be the aphis, and at once applied a mixture of lime, sulphur, and sulphate of copper. Whether this had the effect of keeping the pest away he did not know; but he had never seen it since, although he had varieties peculiarly subject to that disease. His experience of *oïdium* was that sulphur was no cure. It might be a preventive, but it was certainly not a remedy. One gentleman had stated that sulphur should never be applied if the day was too hot. He believed in applying it on warm sunny days, but he did not know at what the temperature should be. In reference to what has been said of the caterpillar pest, he might mention, that adjoining his orchard was a lucerne paddock, and one summer the insects came out and attacked his vines. They came in such numbers as to threaten complete destruction in a few days, and he dealt with them in the manner suggested by a previous speaker. He got a plough and made a deep furrow right round the vineyard, and in an hour's time the caterpillars were lying dead to a depth of 3 inches. As the insects attempted to climb the furrow the earth gave way, and they fell back again. The day was a very hot one, and about midday every caterpillar was dead.

Mr. LANSDOWNE, Goulburn, recommended an application of grease and coal tar for preventing hares from attacking young trees.

Mr. MACWILLIAM, Corowa, said a remedy suggested to him for black spot in vine was to bleed the plants by cutting off their tops.

Dr. FIASCHI, Richmond, said he had had some experience of the woolly aphis blight. An apple-orchard of his was so badly affected with it that he never could get a crop of fruit. He had tried all the remedies suggested, with the exception of liquid clay, proposed by Mr. Gelding. Heavy manuring was one of the treatments he made use of, but it altogether failed. Last year he had intended to have the trees rooted out, and to plant the land with vines, when a gentleman gave him a bulletin of the Californian State Board of Agriculture, wherein was suggested a summer remedy for pears and apples. It consists of the following ingredients:—Caustic soda (98 p.c.) 10 lb., potash 10 lb., tallow 40lb., resin 40lb. The directions given with the recipe were—First: Dissolve the potash and soda in 10 gallons of water, and when dissolved place the solution in a barrel (50-gallon measure). Second: Dissolve the tallow and resin together; when dissolved add the same to the potash and soda in the barrel, and stir well for five minutes or so. Leave standing for about two hours, then fill up with water, stirring well as every bucket of water goes in. Use the following day one pint to a gallon of water, and apply warm. He tried this specific, spraying the trees with it, and he obtained a splendid crop of apples. As to *oïdium*, he did not think there was any cure for it.

Mr. FRAUENFELDER, Albury, in commenting upon what had been said as to the length of the vine-roots, remarked that it was only in rare cases that the roots went so deep as some gentlemen had remarked. He did not believe that the habitat of the phylloxera was as deep as the root. It did not go beyond the influence of light and air. Many of the birds which were destroyed as pests must be insectivorous. He had frequently noticed that, after a shower of rain, the birds would come into the vineyard to feed on the insects, returning to the forest when the weather has cleared. In 1887

Digitized by Google

leatherheads were very destructive; in one vineyard as many as from 70 to 120 birds were shot each day, and this lasted for ten weeks. Since that time their ravages had been less severe.

Mr. S. Holmes, Hunter River, brought under notice the necessity for some stringent legislation with regard to uncultivated and neglected vineyards, which are, he said, no doubt the hotbeds of numerous injurious insects and fungi, and would most probably be the first vineyards to be attacked by phylloxera, as from their uncared for state they would be rendered weak and impoverished, and would therefore offer a splendid nursery for this pest. What is sought in the matter is to compel all owners of grape-vines to cultivate or sulphur them, or to root them up and have them destroyed.

Mr. Cairnes, Parramatta, called attention to a scale disease, which had lately been introduced about Ermington. Judging from what was said of it by those who were suffering therefrom the pest was the worst form of scale which had visited the district. One gentleman had had to cut down all his mandarins in order to save his orchard; whereas, had he known the habits of the insect, he might have saved his trees by spraying. It was of no use attacking the insect with poisons—they must stop its breeding. The fine starch mentioned by Mr. Patterson would be fatal, and Mr. Pye had found an application of soap mixture successful. He further mentioned a species of fungoid attacking orange-trees, which some of the growers had failed to recognise. The marks on the fruit had been mistaken for the effects of rubbing, and even when it was placed under the microscope they failed to identify it. If such an orange was packed and sent for export it would soon develop a brown scale, which would spoil the remainder of the fruit.

Mr. Stieme, Fairfield, speaking of friendly insects, said that last year, when his vineyards were attacked by caterpillars, he found a small bug, with a long nose, which killed them in thousands, without in any way spoiling the vines. The silver eye was a bird which preyed upon the woolly aphis, but, unfortunately, at the same time damaged the fruit as well. In shooting the birds wholesale there was always the danger of killing those who were friendly, and the better plan would be to resort to other means of keeping them away. This year he had suffered very much from a small locust, which demolished the leaves of his vines and pear-trees. Vine sticks were riddled by the insects, and eggs deposited in them. This insect threatened to become a serious pest if not promptly grappled with.

Mr. Hayes, Singleton, condemned the practice of planting lemon-trees for shelter purposes, unless they were carefully cleaned and cultivated like the rest of the orchard.

Mr. Gambling, Thornleigh, said that the best specific he could get for destroying the scale insect upon orange-trees was an emulsion, which was very effective, and it was also very cheap and easily prepared. The mixture was as follows:—2 gallons of wood-preserving or crude oil, unrefined kerosene oil, which could be obtained for 1s. per gallon, and ½ oz. of soft soap, boiled in 1 gallon of water until the soap was thoroughly dissolved, and churned until it has thoroughly mixed and formed a yellow cream. This quantity would make about 90 gallons of wash, the mixture would remain, without separating, for several weeks, and it could be applied easily with a spray pipe. Mr. Lansdowne had spoken of the young leaves of peach-trees curling because of some blight. He had been frequently told that it was due to a disease, but he did not believe it. He was convinced when he commenced growing peaches. He planted several kinds, including an early variety, amid-season, and a late season variety. On the mid-season trees all the leaves curled up, while the others were unaffected. He attributed the cause

Digitized by Google

to the cold winds. Mr. Steime had mentioned locust riddling sticks. He thought the damage was done by the larger cicades, which infested the trees. He had seen sticks in which these insects bored holes and afterwards deposited their eggs. The only way to destroy the woolly aphis he believed, was to suffocate or poison them. He had tried Whateley's specific without effect, and he had also tried cleaning the soil round the roots of the tree.

Mr. BRIDLE, Tumut, said he had tried a great many experiments for the extermination of American or woolly blight. He had covered the tree with calico, and then burned sulphur underneath it, and he not only destroyed every living creature but also the leaves of the trees. As soon as the leaves began to bud again the blight reappeared. The only check he knew was to apply soapsuds, or the lees of wine, to the roots. Peach blight had been very bad in his district. He had tried tobacco-water (1lb. of tobacco to 4 gallons of water) with a little lime added, spraying it over the trees, with excellent results. To be of any use this remedy must be applied early. The lichen, which grew on the bark, he had destroyed with a wash of cow-dung, lime, sulphur, and salt of such a consistency that it could be easily applied with a brush. Of the animal pests as yet they had not suffered from sparrows, and the flying-foxes only came late in the season, going away again at the beginning of April, but they did much damage while they remained. Their worst enemy was the green mountain parrot, which lived on the plums and pears. They came in large numbers and were so quiet that it was possible to shoot half a dozen, or more, at a time. Shooting, he believed to be the only remedy for this pest, as also for the silver-eyes and soldier-birds. To prevent hares from attacking young trees he placed a piece of loose wire netting, about 9 inches wide, round them.

Mr. JACKES, Armidale, said there was a possible danger to many vignerons in the Hunter district, in the vineyards which had been abandoned, and he believed a clause might well be inserted in any Bill, introduced to Parliament, dealing with cases of this kind. These neglected vineyards merely served as breeding places for pests of all descriptions, and he thought the owners should be compelled to destroy vineyards which they did not cultivate. Sulphuring was recommended for *oïdium*, though he believed it would not keep out the disease in some seasons. At the same time, if it were resorted to, it should be applied early and often. He did not think any wine-grower in the Hunter River district had discovered a day on which it was too hot to apply sulphur.

Mr. E. P. BARNES, Cootamundra, said that they had had the fly-pest in the Cootamundra district for some time, but not to any considerable extent. It first appeared last year. The fly was grey or slate coloured and it generally was to be found when the foliage was densest. The tree particularly affected by it was the English mulberry. In gardens where there was an accumulation of rubbish or weeds the flies were most troublesome, attacking not only the mulberry but also the peach trees, near the roots. People were likely to be misled if they looked for a green fly. The pest he referred to was grey, and very similar to the flies which congregated on cheese. He had heard reference made to larkspur as a preventive for locusts and grasshoppers. About four years ago, in the Cootamundra district, there was a plague of caterpillars which affected a limited area of 14 or 15 miles, and every green thing in their path was eaten up; they even attacked green cherries on the trees. In his garden a quantity of the common larkspur grew, and he did not know whether it was on this accuont or not that it was less infested than many others around. The woolly aphis was a terrible pest to apple trees, and difficult to cope with.

Digitized by Google

One gentleman has stated that he had applied, with some success, a mixture of boiled oil and sulphur. The best time to use the wash was during the winter months. When in Goulburn, some two years ago, he visited an orchard in which was a young tree infested with the pest. The owner asked what he should do, and he told him to cut it down and to plant a blight-proof variety in its place. Instead of doing this, however, the gentleman painted the tree with boiled oil from top to bottom, and he also bored the roots and poured in the oil. Now, that tree was as clean as possible. With regard to the curled leaf on peach trees he was quite of opinion that it was not due to any fungoid, but to the cold winds which often prevailed when the leaves were young and tender. The best method for keeping hares from young trees was to enclose the whole of the orchard with wire netting.

Mr. ADAMS, Liverpool, said that sulphuring could not be commenced too early. It was his custom, as soon as the buds began to burst, to make the first application. When they were about an inch long he applied it again, and then at intervals of a fortnight. He applied the sulphur with a small pair of bellows, using a lesser quantity than was usual in the case. The sparrows were a great nuisance to them, and it would be almost impossible to grow vines without covering them in with wire netting. He was preparing a quarter of an acre of ground for vine-growing, and he would be obliged to adopt this course. He did not see how they could eradicate this pest without legislation, and he suggested that a suitable clause should be inserted in the Local Government Bill.

Mr. PURSER, Seven Hills, said that a mixture of soft soap and sulphur had kept his orange trees free from disease, while he had also successfully used an emulsion, consisting of 1 gallon of gas-tar to 40 gallons of water, applied by means of a sprayer. For white aphis he had used a mixture composed of 4 lb. sulphur, 4 lb. soft soap, and 6 gallons of water, well stirred, very effectively. The stems of the trees should be painted with the mixture to as far as the large limbs. He believed in using sulphur for orange trees; for no matter how much a tree was affected the fumes would cause the insects to die. He had tried resin and caustic soda, mixed with oil or tallow, for woolly aphis. It was effectual in destroying the aphis, but it reappeared the following year. Another cheap remedy was an emulsion of soap and kerosene. For white aphis the first-named mixture had proved effectual. It should be applied early in the year, and to the stems and large branches, before the new wood was developed. As soon as the fumes were drawn up the tree the insects cleared off. For woolly aphis he had used an emulsion similar to that mentioned by Dr. Fiaschi, and he had succeeded in keeping his trees clean. He had also tried liquid clay with some success, but its application involved too much labour. He knew of nothing which would eradicate the pest entirely, and it was necessary to fight it continually in order to keep it under.

Mr. M'KEOWN, Gordon, said that for many years he had applied lime and sulphur to his trees to kill the white louse scale in the same manner as Mr. Purser, but he had not found it a complete success. This season he had sprayed the trees with a common syringe, with a mixture of unslaked lime and sulphur, three parts to one. If slaked lime were used it would be necessary to boil it, but by using unslaked lime the mixture boiled itself, and thus saved much trouble. It proved better than a kerosene emulsion, because it killed all the moss which grew upon the trunk of the tree.

Mr. GAMBLING, Thornleigh, pointed out that in preparing the wash referred to by Mr. Purser the proportion of crude oil should not be 1 to 10, but 1 gallon to 40 gallons of water.

Digitized by Google

Mr. JACKES, Armidale, remarked that last season the bird pest was very severe in the New England District. He had seen between 2,000 and 3,000 of them shot, principally green parrots.

Mr. CAMPBELL, Blacktown, said he differed from Mr. Scobie when he said that the flying-foxes never hung in strings. He had frequently seen them suspended five or six deep. His orchard had suffered severely from hares a few years ago, all his young trees being destroyed. He tried painting the trees with a tobacco and other solutions, but this only drove them away for a short time. He next resorted to wire-netting placed around the stems, and the hares, instead of attacking the stems, tore down the branches. Finally he obtained 5 miles of 3-inch wire netting, and thoroughly enclosed his orchard, and by this means only he had succeeded in keeping away the pest. He had also been troubled by silver-eyes, and he kept them down by shooting them as they attacked the mulberry trees which fruited before the vines. The sparrow question was one of the most difficult they had to deal with. Only within the last two years had they troubled him, but they destroyed a large quantity of grapes. All he could do to get rid of them was to scatter poisoned corn in the winter, when food was scarce, and also to shoot as many as possible. Mention had been made of gum exudation from lemon trees. They had suffered very much from this in the County of Cumberland.

Mr. LANKESTER, Albury, said that in his idea the only way to deal with the flying foxes was to thin them out by shooting. Periodical shooting parties could be organised to attack them in their camp. The fly which has been talked about infected his vineyard during the last season. This was the first time he had noticed it. The Muscatel, Frontignac, and other varieties of grapes were those most affected. Wherever the pest clustered the thickest the grapes shrivelled up as if a branch had been broken. The remedy he tried was one suggested by Mr. French, the Victorian Government Entomologist. It consisted of a preparation of benzine, which, however, did not mix very well with water, but at any rate it acted remarkably well. This specific, however, was much more expensive than some others which had been suggested. Quibel's Insect Destroyer was also said to be an efficacious and cheap remedy. Grasshoppers troubled them very little. The apricot trees were very much subject to a red rust, which injured both the foliage and the fruit, and a blight that also affected the pear trees, and no remedy had been found for either. The peach blight he had destroyed by a decoction of tobacco and soft soap, which he used with a syringe, but this injured the foliage and ruined the trees for the season. The bug which infested the vines was an Australian insect, and not an imported one. He was not previously aware that creosote had been used for any pests. The most troublesome pests they had to contend with were the birds, and of these the leather-head, soldier-bird, and the thrush were the worst. During the last three or four years crows had been very destructive. They came in flocks of from 500 to several thousands, and did not peck the grapes, like the smaller birds, but carried them away wholesale. It was his opinion that all these birds should be included in any Bill which was brought forward. He had used lime and sulphur on his trees, but he fancied it injured the bark.

Mr. WHITAKER, Parramatta, said that in 1885 the growers in the county of Cumberland attempted to deal with this question of pests. They formed themselves into a Fruit-growers' Union, and their object was to organise united efforts in getting rid of the enemies to the fruit; but they found their task to be an extremely difficult one. Their great drawback was the want of an authority to give them information how to proceed. They had to thank

Digitized by Google

Mr. Olliff for putting them on the right track. The first pest they attempted to deal with was the codlin moth. He obtained a specimen in larva, and wrote to Mr. Olliff to ask if the moth was in the Colony. The reply he had was "yes;" but Mr. Olliff was not certain how long it had been existing here. He was quite satisfied with the answer, but in order to make sure he wrote to Mr. Vickery. That gentleman said it was not here. He made further inquiries in Melbourne, and obtained specimens of the codlin moth from different parts of the world, and, upon comparing the insects, he was convinced that the dreaded pest was amongst us; and the Fruit-growers' Union at once set to work to eradicate it. They soon had to desist, as they were simply making known to the world that their fruit was infected with disease, thereby spoiling the market. They continued to get information, but their work was retarded by the action of individual growers. There seemed to be a variety of opinions about scale insects. He believed they would find that many of these insects were indigenous, and that the loss of their natural food, by the destruction of timber, had caused them to infest the orchards. The black scale on the orange, and other pests equally as bad, was, like the aphis, indigenous. Some thirty-three years ago he came across the aphis at Lane Cove. It was then thought to be phylloxera, and a public meeting was held. The insect was not unlike phylloxera, simply being different in colour. It was a native of the bush, and could be found about almost anywhere. In dealing with the birds they must be very cautious. Frequent reference had been made to the leather-head. This bird was one of our best insect destroyers, so it would be seen that, in framing any Bill, they must be careful. A good basis for legislation in this direction would, he thought, be the Stock and Pasture Act, and this would necessitate a slight tax upon fruit-growers. He had a copy of such a Bill, which had been discussed and adopted by the Union, but was abandoned in consequence of the opposition of a large number of fruit-growers. He had obtained Acts from Melbourne and Adelaide, and, by selecting the most suitable clauses, they had framed a Bill, which, with slight amendments, he hoped soon to see become law. The main point he would urge upon growers was unity.

The DIRECTOR stated that the Department was exceedingly anxious to hear the views of the delegates upon this question of legislation. Did they wish to have District Boards, governed by a Central Board; or, did they wish to have District Boards acting independently? Were they willing to pay a fair tax to the Board, and that the Board should administer the funds with Government grants to assist them? Did they desire to appoint their own inspectors; or, did they prefer that the officers should be under the control of the department? These were vital points, and must be well considered, and to assist them they had the experience of Victoria and Tasmania. He suggested that before the Conference terminated the delegates should present the Minister with resolutions embodying their wishes.

The Conference then adjourned till 7 p.m.

On the Conference re-assembling in the evening,—

Mr. ANDERSON (*Director*) announced the result of a meeting of the Committee appointed to consider the advisability of carrying out Mr. Culley's experiment in regard to phylloxera. It appeared, from what Mr. Culley told them, that his process would be to introduce in the vines, in the winter time, a certain substance which would poison the sap, and by this means kill the insect feeding on the tree. In order to exemplify this, he wished to obtain an infected vine, but the Committee was unanimously of opinion that they could not recommend such a course. They agreed,

Digitized by Google

however, that Mr. Culley might be allowed to experiment upon an apple-tree infested with woolly blight, and on a rose-tree infested by aphis, to test his method. This was the arrangement they had made, with the further condition that Mr. Whitaker should conduct the experiments at some place within a short distance of Sydney. If Mr. Culley could prove that his poisonous substance would travel to all parts of the tree, and that the insect would absorb it and be destroyed, it would be a great step towards the verification of his theory.

Mr. CULLEY thanked the Committee for the consideration they had shown him, and said he would be most happy to enter into the arrangement suggested.

Mr. SCOBIE, West Maitland, resumed the discussion upon pests. He remarked that very little mention had been made of friendly insects, and that there seemed to be a misunderstanding as to which did, and did not, belong to this class. First, there was an insect known as the ladybird. From many years' experience of them he had found they were most destructive to all classes of lice, and to the aphis on all varieties of fruit. The black aphides which appeared on the young shoots of orange trees were attacked by the ladybirds in some seasons, and completely destroyed. He had seen them similarly destroy the peach aphis, and the woolly apple blight, making a clean sweep of every insect above ground; and though for a time the trees appeared to suffer, they were soon in full bearing. There were several varieties of the ladybird, some being black with yellow spots, and some yellow with black spots. Only two kinds were understood to be destructive to vegetation: One was a long shaped insect, which attacked cucumbers, rock-melons, and pumpkins, and it could be identified by four spots on its back; and there was a second, the largest of them all, which was generally found on the potato, and sometimes on the pumpkin vine. This insect was of a dark, dirty colour, and had many spots on its back. He had not seen either of these on fruit trees, and they were the only ones he knew to be destructive. Some persons, knowing that they were injurious, destroyed all the ladybirds which came in their way. The friendly insect of this species generally laid its eggs, which were of a yellow colour and long in shape, on the tree. He had noticed, as soon as an insect was hatched, that it immediately attacked the first aphis it came across, and ate it most voraciously. Another friendly insect was the mantis, or native lady, of which there were many varieties, some small, some large. It was specially destructive to insects of the fly tribe, and it also destroyed the eggs of grasshoppers. A prominent member of his Association once told him of the great number of eggs he destroyed each year, by employing children to pick them off the fruit trees. From the description given he knew them to be the mantis. He spoke to the Secretary, and told him what he had learned of this insect, at which he was much surprised, though he afterwards found it to be correct. The grasshopper generally laid its eggs (which were similar to a mussel, being clear inside when broken) in a little hole in the grape-stem, covering them up afterwards with small pieces of wood bitten from the tree; and sometimes the eggs were deposited in the ground. It was well that they should be able to identify the eggs of the different insects, or they might destroy insects friendly to them. Then there was a large hornet which fed upon caterpillars, sucking them dry, and leaving only the skin and head. Another insect he had termed the grub-sucker, because of its long mosquito-like proboscis, which was a deadly enemy to a grub that attacked his vines last year; and he had seen one vineyard almost destroyed by it. Some years ago an insect appeared which attacked the

Digitized by Google

cabbages and sweet turnips so badly that it became almost impossible to grow them. This year he could not discover any of the insects, and he attributed their disappearance to the ichneumon fly. Another insect which was a friendly one, was not unlike the codlin moth in appearance, which was found on young trees, and made a house from the scales of the insects which it destroyed. He would furnish the Department with specimens of the different insects he had mentioned, so that orchardists might become familiar with their appearance.

Mr. H. C. CATO, Sydney, said he had a recollection of the Californian blight referred to by Mr. Scobie. During one season it was so bad that cabbages could not be grown, but latterly it had been exterminated; how, he did not know.

No other delegate desiring to speak about pests generally, the President invited discussion on the question of phylloxera.

Mr. FRAUENFELDER, Albury, reiterated that deep rooting was not a general thing with vines. He did not believe, as some people seemed to do, that these deep roots kept the phylloxera alive after the tree had been cut down. The phylloxera did not live deeper in the soil than 3 feet, as, at greater depth, it would be deprived of light and air. In his opinion the pest was not spreading with so great a rapidity that it could not be stamped out by destroying the vine. The disease was still in its infancy, and should be eradicated with all possible expedition; and the best way to achieve this was to continue the system of rooting up infected vineyards, and thoroughly trenching the ground. He was not acquainted with the details of the present mode of inspection, but it seemed to him that, if great care was not exercised, there was a possible danger of the inspectors spreading the pest. For instance, the officer appointed to look after an infected vineyard might carry the phylloxera on his boots into another district which was not known to be infected; and so, in other ways, the disease might be spread. In company with another delegate he had lately seen the operations which were being conducted at Seven Hills to eradicate the phylloxera. They found that the work was done as fairly as possible. In several vineyards they closely observed the trenching, and noticed that the depths ranged from 22 to 26 inches; they found portions of vine roots, from 5 to 6 inches long, lying about, all of which had begun to decay, but they could see no trace of the disease, either in those trenched early or late. He strongly favoured a thorough system of trenching, but did not agree with any experimenting with specifics for exterminating phylloxera. He suggested, as a good way of killing off some of the fly pests, that insecticidal herbs should be grown in hedges.

Mr. STIEME, Fairfield, said that once the phylloxera had established itself in a vineyard it was of no use resorting to half-measures; they must root out the vines at once. In the old country, where whole districts were infected, they might attempt to save the vineyard as much as possible; but here, where the disease was confined to small areas, eradication was the proper course, even though it might cost the State a little money. With regard to the length of vine roots he had frequently found them, in his district, over 6 feet from the mother plant. He knew of no tree in existence whose roots travelled further than the vine. Last Session a deputation waited upon Sir Henry Parkes, to ask for legislation against phylloxera, and presented amendments to the old Bill which were considered to be necessary. They were told that there appeared to be an objection in Parliament to further legislation, and just at the close of the Session the old Act was renewed. It was a very easy matter for an outsider to find fault with the steps which had

Digitized by Google

een taken to cope with the disease. If the members of the Board did not o their duty their services should be dispensed with; it was the duty of he department to keep a close watch over their officials. With regard to he control of men working on infected ground, he might mention that the ustom in Germany, as soon as phylloxera broke out in a district, was to stablish a kind of quarantine; no man was allowed to leave the ground; verything they needed was brought to them, and he believed that was the roper course to adopt. He had brought with him a copy of the old Act, on which he had written a number of amendments, which he thought were worth consideration by the Board, as they dealt with the question of controlling he men, and as he considered the phylloxera was largely propagated by the employés in infected vineyards. The insect was not a vigorous one in the open air, and it could not travel far, neither would it penetrate deeply into the earth. In reference to the question of compensation, he thought if too high a sum was fixed, it would only act as an incentive to slovenly growers to propagate the pest. When it was known that the disease had appeared in a vineyard it was much better for the owner to take a fair compensation and allow the vines to be rooted up, than to endanger neighbouring vineyards. [Mr. Stieme handed in his copy of the amendments he had drawn up.]

Mr. MacWilliam, Corowa, inquired of the President, if it was a fact that certain gentlemen had entered the vineyards at Seven Hills without the Board's permission, and had taken away infected vine roots?

The President said that it was impossible for him to say whether any one outside the department had entered the vineyards. He had himself directed the entomologist to visit one of the infected vineyards, in order to inspect it. That gentleman went, and brought back with him some roots covered with the insect; but he took every precaution against the spread of the disease by at once placing them in alcohol, before leaving the ground.

Mr. Cato, Sydney, asked if it was a fact that phylloxera did not live on the fruit? In every Colony, with the exception of Tasmania, New South Wales grapes were not allowed to enter—the reason given for this being that the phylloxera might be introduced. If the disease did not affect the fruit there was no reason why our grapes should not be placed in the Colonial markets.

Mr. Anderson (Director), in answer, said that phylloxera affected only the roots and the leaves of the vine.

Mr. Lankester, Albury, said the question of phylloxera had been before the country for some time, and it had been discussed in every possible way. At a recent Conference, held in the Town Hall, at least a day and a-half was spent in debating the matter, and still the phylloxera existed. He was well aware that the Board had had to work under a very imperfect Act. At the Conference just referred to they prepared an amended Bill, and submitted it to the Government; but the old Act, which should have expired on the 31st December, was renewed for twelve months. It was desirable that, as soon as possible, a new Bill should be introduced. It was not his intention to say anything in reference to the visit which he, in company with Mr. Frauenfelder, had made to the vineyard at Seven Hills, because he was simply appointed as a delegate by his Association to make visits of inspection. He would merely remark that they did not find any trace of phylloxera in the grounds which had been trenched, although they had two men digging for them. They, however, noticed the disease in vineyards, which were being trenched under direction of the Board, and also in one which was about to be trenched. If he was in order he would like to move a resolution referring to a Bill to deal with insect and other pests. It was,—"That in

Digitized by Google

the opinion of this Conference, it is desirable a Bill should be introduced into the Legislative Assembly without delay, taking as a basis the Stock and Pastures Act and the draft Bill handed to the Government by the deputation after the Conference held in the Town Hall in March, 1889, enacting the compulsory cleaning of orchards, vineyards, &c., and the repression of insect, fungoid, and other pests; the outline of such Bill to be drawn up by a committee of vignerons and fruitgrowers appointed by this Conference."

Mr. STIEME, Fairfield, seconded the resolution; but, as several members of the Conference considered the time inopportune for a discussion on such a subject the resolution was withdrawn.

The PRESIDENT, at this stage, informed the meeting that Mr. Kidd, one of the members of the Phylloxera Board, was present, and he thought it as well if he (Mr. Kidd) offered a few remarks.

Mr. KIDD, M.L.A., in response, said that, having been connected with the Board since its formation, he felt privileged in being afforded this opportunity of stating what they had been doing, so as to allay the feeling which had been created, not only in this but in the adjoining Colonies. He specially referred to the adjacent Colonies of Victoria and South Australia, as they bore one-third of the expense which the Board incurred by its efforts to eradicate the phylloxera pest in New South Wales, and must therefore feel a strong anxiety that this work should be done and done well. It was proper that the action of the Board should be criticised, and particularly by those connected with the fruit industry; but he thought that one or two gentlemen had somewhat exceeded this. If these gentlemen were so anxious for the proper working of the Board their best course would have been to bring any complaints they had to make before the Board, instead of before their Associations. Many difficulties had presented themselves to the Board, and the question of compensation was one of the greatest. Very frequently, when a vineyard was attacked, the owner believed that his property was a most valuable one, and that he could not be too highly compensated for it. Only that day they had received a letter from a gentleman in which £150 per acre was asked for a diseased vineyard, and anyone who was acquainted with the district would know how excessive that charge was. Under the Act which had been previously referred to the Board could not give compensation in excess of the amount necessary to form a new vineyard, and this only in extreme cases, such as, for instance, where much labour and capital had been expended in trenching the ground, and where the vines were not very much diseased; but when a vineyard had been neglected, and the phylloxera had pretty well completed its ravages, it was not likely that they were going to give high compensation. In all cases it had been the endeavour of the Board to deal fairly between the grower who sought compensation, and the public whose interests they had to guard. The Board fully believed that they had eradicated the disease some time ago, when it suddenly reappeared at Seven Hills; and, while mentioning this, he would remark that it would be very much better for the Board if they had worked more under the Victorian Act, and less under that of New South Wales. The former measure gave power to destroy not only infected vineyards but all situated within 3 miles of the diseased area. If such a provision had been in force here, and the work of eradication had been energetically carried out when the disease first broke out, phylloxera would have been destroyed long ago in New South Wales. The Board had endeavoured, in all its operations, to economise the public funds as much as possible, and to refrain from sacrificing any property where it was thought that the disease could be rooted out by destroying only a small portion of the vineyard. Experience

Digitized by Google

had taught them the fallacy of this course. If only one vine was affected it was almost certain that the disease was latent throughout the vineyard. They had a striking instance of this in a vineyard at Seven Hills. Phylloxera was discovered just in one corner of the ground, and only on a few vines; and the Board considered that by simply destroying the infected vines, and a few others in the vicinity, and also by thoroughly trenching the ground, they would succeed in their object. Heavy rains soon afterwards set in, and the inspector was unable to inspect the vineyard, as he should have done, and the consequence was that in a few months the disease showed itself all over the vineyard, so much so that the owner destroyed the whole of the vines in order to plant oranges in their stead. The Board had had to trench the ground, and they found almost every root infected with phylloxera. It was policy, as soon as the disease was discovered in a vineyard, to at once treat with the owner, and destroy the trees as speedily as possible. So far as they were aware, they had in hand all the infected vineyards, and, within the next month or six weeks, every one of them would be destroyed; but of course it was quite possible that there might be others of which they were at present unaware. While it might have been better, as he had just remarked, if a similar power to that which existed in Victoria existed here, the compensation difficulty would have been just as great. He could quite understand, if healthy vineyards had been destroyed in accordance with the provisions of the Victorian Act, that the proprietors would be dissatisfied unless they obtained ample recompense. On the other hand, when a vineyard was once infected, it was only a question of a very short time before it would become almost valueless. He suggested that, in any new Bill which was introduced to Parliament, provisions for compensation, similar to those contained in the Stock and Pastures Bill, should be inserted. He repeated that the Board had sought, on every occasion, to act equitably between the growers and the public. The system pursued by them was to trench to a sufficient depth, and to extract from the ground as many of the roots as possible, and to destroy them by fire. The men employed in infected vineyards were quarantined, though not so rigorously as some desired. They worked in old clothes, which were destroyed when the men left one vineyard for another, and they were granted some little compensation. Every care was exercised by the inspectors; they were not even allowed to carry a spade from one vineyard to another. He did not believe there was any risk of phylloxera being spread by carelessness on their part. He wished the Conference to bear in mind that the Board had had to watch the interests, not only of New South Wales but of other Colonies, and he reminded them that when the vineyards at Geelong were destroyed, this Colony contributed some £10,000 towards the expense. The total cost of the working of the Board here had not exceeded this amount, and, unless the disease appeared in other vineyards, it would not do so. He regretted that the pest had reappeared at Seven Hills, and he hoped, in the interest of what he was sure would be a great industry, that phylloxera would soon become extinct.

Mr. Frere, Thurgoona, said he considered the explanation which Mr. Kidd had just given the Conference was a satisfactory one. As far as he was aware, the pest was confined to the Seven Hills, Toongabbie, and Camden Districts, and he thought that under ordinary circumstances, and with every precaution, it could be prevented from spreading further.

Dr. Fiaschi, Richmond, said he quite approved of the system of defence against phylloxera which Mr. Bucholtz had quoted to them from a book recently published in Germany, where the vineyards were close together;

Digitized by Google

but where they were some distance apart, and bush intervened, he considered it advisable to continue the system of destruction at present followed by the Board. If, however, the disease continued to spread in spite of these stringent measures, it would be a question for consideration whether they should abandon this plan and resort to defence. When once the disease had attacked a vineyard, unless prompt measures were taken, it would soon be destroyed. It was a well ascertained fact, that, if owners were allowed to defend themselves, they could, at no great expense, check the progress of the disease. They had been told that in Germany a specific, which had been used with some success against phylloxera, was creosote.

Mr. KIDD said that he did not wish to be misunderstood in what he had said with regard to experimenting. It was the experience of the Board that, as a rule, those growers in the Camden district who resorted to remedies had failed to destroy the disease. The remarks he had made were based on the present condition of things.

Dr. FIASCHI (continuing) said that, having gone into careful calculations, he was convinced that a vineyard could be defended for £5, with bi-sulphide of carbon, providing there was an ample supply of water close at hand, and that the area was not too large, nor the land too clayey. Under the Act which was in force here the vine-grower was precluded from defending himself. The moment he found a sign of the phylloxera he was obliged to make a report to the Board, and they stepped in and destroyed his vineyard. Then it became merely a question of compensation. A sliding scale had been prepared, and the reason was that if a vineyard were left alone the disease would soon have destroyed every vine. Just one word before he finished, with reference to the propagation of the disease. He believed that the chief means by which the disease had been spread in this country were the cases in which the fruit, and especially table varieties, had been packed. The cases, after having been sent to market, were returned, and made use of in other vineyards, carrying soil on them from infected districts. He strongly advocated a policy of destruction, while, at the same time, he thought that growers should be fairly compensated for their loss. [Mr. KIDD: What do you call fair compensation?] The question of the cost of vineyards has been amply discussed. From what he could gather, there were two forms of viticulture: one was illustrated by the system pursued in the county of Cumberland, and the other by that in the Murray Valley. The first he estimated to cost from £30 to 40 per acre, and the second from about £12 per acre.

Mr. WHITAKER, Parramatta, read to the Conference the following remarks upon the subject of phylloxera-proof vines, which he stated had been handed to him by Mr. James Harold, who had had some experience on the subject: "In regard to phylloxera-proof vines it would be interesting to know the names of the varieties of which the gardener at Rookwood is possessed. So far as I understand, the *Vitis riparia*, the *Vitis æstivalis*, and the *Vitis californica*, are the only proof varieties, and these are resistant only so far that their tough woody fibrous roots withstand the ravages of the insect; but when once the disease appears it will breed on these, and be disseminated from them as readily as from any other varieties. The American proof vine is the last resource as a stock for grafting, and it has only been used for this purpose in countries where the phylloxera has become master of the situation, and where no member of the *Vitis vinifera*, or European vine, can exist. The most resistant stocks are not the best upon which to graft, as they are wild vines with small tough roots, and when grafted the stock continues small and the scion large, thus weakening the plant at the graft. The majority of American vines are not resistant—as, for instance, the Isabella—although some people

Digitized by Google

say they are. The vineyards of this Colony, I submit, have not yet come to that pass when these, comparatively speaking, inferior stocks need be used. In France, Germany, Austria, Italy, and some portions of America, the case is different. There the phylloxera has completely destroyed the vineyards, and, as a desperate remedy, the wild grape stocks of America have been resorted to, but in no case are they so good or so profitable as varieties of European grapes. In view of these facts it will be for the Conference to consider whether it is safe or desirable to experiment with these plants, and perhaps spread disease abroad in districts where possibly it has never before existed. It is worthy of note that the wine-growers of California have recently demanded the uprooting of the resistant stocks growing in the University grounds at Berkeley for experimental purposes, on the ground that they have been the means of propagating the insect, and infecting other plants which were being sent out to other parts of the country."

Mr. SCOBIE, in replying to the criticism which had been passed upon his paper, and upon the subject of pests generally, said he agreed with the views which Mr. King had expressed on the subject of phylloxera. So far as he could gather from that gentleman's paper, Mr. King had said that the disease was confined to so limited an area at the present time that any tampering with it by remedial measures was out of the question, and that they should carry out the system of eradication which had been inaugurated by the Board. Notwithstanding the strictures which had been passed upon the policy of the Board he was quite satisfied that they were doing all that was possible under the Act to eradicate this pest. Two papers had been contributed upon this important subject: the one by Mr. King, giving one side of the question; the other by Mr. Bucholtz, on the other. In Europe, where the disease had assumed such proportions that it was almost impossible to grapple with it by rooting out the vines, the growers were justified in resorting to remedial measures. Unfortunately, however, none of these remedies had proved completely successful. Even the specific, to which Mr. Bucholtz had alluded as having been adopted in Germany, was evidently not trustworthy, or they would have heard of its having secured the reward which had been offered for a cure. He was fully of opinion that in any legislation in this matter they should confine their attention to the phylloxera, and not attempt to combine with it other pests which are altogether different in character. This disease had proved to be the most destructive of all which had attacked fruit. He had intended to move a resolution somewhat to this effect: "That, in the opinion of this Conference, any legislation, having for its object the devising of means for the eradication of phylloxera, should confine itself to that subject alone." The draft Bill prepared at the recent Conference held in the Town Hall was too comprehensive in its scope, for it dealt with the whole question of pests detrimental to vegetation; and it was almost certain that if such a Bill were introduced into Parliament it would cause such a large amount of discussion as to endanger its passage through the House. The measure they brought forward should be as simple as possible. In the case of phylloxera it was proposed to destroy the vineyard and give compensation, but this was not suggested for any other pest, because no remedy had been discovered; for phylloxera there was a remedy, if they only went far enough. The growers and the department should help each other to discover absolute remedies for these different pests before legislation on the subject was proposed. Many specifics had been suggested from time to time, but, on being tested, were not found to be what they were represented. He recollected, for instance, that when the cabbage blight appeared, a gentleman

Digitized by Google

in West Maitland came to him and told him, as a great secret, that he had discovered a remedy for the pest. It consisted of mill ashes. This gentleman had put the ashes round some of the plants, which afterwards appeared to be freed from the pest; and he at once concluded that the ashes had done the work. In his own case he applied nothing; but a heavy thundershower killed the insects, and thus cleaned the plants; and to this cause he attributed the disappearance of the pest in the other garden; not to the ashes. Speaking of Mr. Culley's supposed cure for phylloxera, he considered that, owing to the similarity of the insects, the apple blight would be a fit subject to experiment upon; and if he succeeded in killing it, by introducing poison into the sap of the tree, it might be advisable to inoculate a grape vine as a test. But even in the event of the experiment proving successful he would prefer that further trials should be made in countries where phylloxera had a firm foot-hold, and that the system of stamping out should still be pursued here. One gentleman had disagreed with what he had stated about the flying-foxes hanging singly on the trees and not in clusters. He simply gave what was his observation of their habits. The paper contributed by Mr. Patterson was a very simple one and likely, if put into practice, to prove of considerable service.

Mr. GRUNSELL expressed his gratification to Mr. Scobie for his able remarks upon friendly insects. He said he had given some attention to the subject, and more than once he had called attention to the ants as insects which were friendly to orchardists. He had frequently seen them attacking small caterpillars, and also the peach aphis. His remedy for flying-foxes was to shoot them, and to poison them with apples treated with strychnine. For woolly blight his remedy was to brush the trees with an old hard broom. It would be a great advantage if some remedy could be discovered for getting rid of borers. He used sulphur for *oïdium;* applying it when a light dew was falling.

Mr. BRADBURY cautioned the Conference as to the use of dangerous poisons as remedies for pests. He suggested that, if poisons were resorted to, some steps should be taken to prevent the use of arsenic and strychnine by ignorant persons, for if only one or two were poisoned confidence in Australian fruit would be destroyed for years. Scheele's green, which had been mentioned, was a preparation of arsenic; and so were other specifics which were occasionally used. One gentleman had recommended acetic acid, but it was not necessary to use such poisonous chemicals; there were a number of remedies less dangerous and equally as effective. London purple was an aniline product of coal tar.* All coal tar compounds were effective. Naphthaline and creosote were cheap, but difficult to use. Creosote was not soluble in water, but it was possible to make an emulsion of it with alkalies. Tobacco and nicotine were largely used as specifics, but they were too expensive. A mixture of caustic soda, tar, and resin had been suggested as a cure for apple blight. The first-named ingredient was a dangerous thing to have in the household, and the mixture, when prepared, was merely a resinous soap which could be purchased for a few pence, and thus all trouble and danger would be saved.

Mr. BUCHOLTZ said he had read the extracts from the German authority with the best intentions. It was the first time the work had been brought under his notice, and he thought it only right to bring it before the

* London Purple is a refuse obtained in the manufacture of aniline dyes, and consists of lime, arsenic, and carbonaceous matter. It was first used against insects in America in 1878, and is there much prized on account of its cheapness as against Paris green which costs twelve times as much. It is more soluble, less poisonous, more adhesive and permanent in its effects, and of a decided colour. It is now imported by Elliott Bros., O'Connell-street.—*Editor.*

Digitized by Google

vine-growers. Ever since phylloxera had made its appearance in the colony he had taken a lively interest in every endeavour for stamping it out. When the disease was discovered at Camden the Vine-growers' Association at Mudgee had a paper prepared, which they circulated throughout the colony, with a view of urging upon vignerons the necessity of taking united action for stamping out the pest in its incipient stage. No notice, however, was taken of this, and, whereas at that time the pest might have been eradicated for a few hundred pounds, it would now cost thousands. It was difficult to prove that only a few vineyards were infested; for aught they knew, the disease might be lying latent in many other districts. It was a question to be considered whether or not experiments should be made with creosote whenever opportunity afforded. With regard to compensation, he pointed out that phylloxera might make its appearance in a vineyard just as the trees, after several seasons failure, were beginning to bear, and that the Board would step in and destroy it; whereas, if remedial measures were resorted to, the vineyard might be kept in a productive and profitable state. He had been as strong an advocate of uprooting diseased vines as any man, but matters had reached such a stage that they must begin to look ahead, and be careful in what they were doing. For American blight he had tried a mixture of clay, sulphur, and lime, recommended to him by Mr. Angus Mackay. The sulphur should be mixed with unslacked lime, and the water then poured upon it This, when mixed with clay, should be washed over the butts and thicker limbs of the trees. An effective remedy for peach aphis was to syringe the trees with a tobacco solution. In his district they had suffered severely from hares, and during the last few years the Local Stock and Pasture Board had paid for several thousand scalps. Where there were a number of small trees a cage, made of wire-netting, with a 2-inch mesh, was effectual in keeping the hares away. He did not believe in the use of oil mixtures.

Mr. WILLIS suggested that dirty fat, rubbed on apple-trees, would kill the codlin moth. They had suffered much from crows, and he thought that they, as well as several other birds, should be declared noxious. Neither the flying-fox nor the hare had been so denominated, and it only required an application to the Minister for this to be done. He believed that a Bill, based on the lines of the Stock and Pasture Act, would give ample powers to the various District Boards to enable them to deal effectually with all pests.

Mr. LANSDOWNE, before the sitting terminated, asked if it was intended to submit any practical resolutions.

The PRESIDENT replied that this was a matter for delegates to determine at a later period. It would be quite competent for any of them to submit resolutions.

The Conference then adjourned.

Before proceeding with the business on the paper, the PRESIDENT announced that Mr. Thompson, Acting Entomologist for Tasmania, was present, and had kindly volunteered to make a few remarks upon pests, and especially upon the codlin moth, which he thought would be interesting to the Conference.

Mr. THOMPSON said he only arrived in Sydney on the previous day, and he was exceedingly anxious to be present at this gathering. He would be glad to answer any questions that were put to him. He might say that they in Tasmania scarcely considered that the codlin moth was their worst enemy. He was inclined to think they had much more to dread from the white-marked tussock moth. He was much afraid that this insect would become

Digitized by Google

a deadly pest. It was spreading very rapidly, and possessed even worse features than the codlin moth. With regard to the latter he had proved that it could, by effectual methods, be stamped out. In some of the worst infected districts around Hobart the proportion of some fruit had been raised from 5 to 75 per cent., and this had been brought about by spraying the trees and by bandaging the trunks. Personally, he had not much faith in bandaging. Unless it was properly and systematically carried out it was of little or no use; but, by spraying the trees with London purple or some other preparation, the percentage of sound fruit had been considerably increased. He was happy to state that in the Huon district, in which he lived, they had not now the codlin moth. The disease had broke out on three occasions, but it had been completely stamped out. In one orchard at Huonville, a number of moths were discovered, and the owner of the orchard, instead of reporting to the Board as he ought to have done, himself took active measures, and succeeded in eradicating the pest. The method he employed was simply to destroy all the fruit on the infected trees, and to disturb the ground in their immediate vicinity, so that there should be no possible shelter for the grub. Two other cases occurred on the opposite side of the river which were promptly dealt with by the Fruit Boards. And speaking of Fruit Boards, he might mention, that in Tasmania they had a number of these bodies scattered over the island. He believed there were twenty-five in all, averaging from seven to eight members on each. When any pest broke out, if the orchardists refused to take active measures the Board stepped in and did the work for them. Each Board had power to levy a tax equal to the requirement and size of the district over which it had control; in his district, for example, the tax was 6d. per acre, while in the northern part of the island it amounted to 4s. per acre, and it might (in any case) be raised to 10s. if found necessary. He repeated that it had been proved in every case, where the codlin moth appeared, that it could be stamped out. With regard to mussel blight, which was far more injurious than the codlin moth, inasmuch as it destroyed trees, while the moth only affected the fruit, he had found the kerosene emulsion recommended by Mr. Maskell's to be the most effective. He had tried many specifics such as caustic soda, lime and soda, &c., but none of them had answered so well. The emulsion he had referred to destroyed both the scale and the eggs. He did not know whether root-fungus was to be found in this colony—if it was it should be at once examined into—but it was a serious trouble to them, and he was sorry to say that it was increasing. He believed that the pest had come to them from New Zealand, where, according to Mr. Kirk's work, it was doing great harm in the North Island. In one year, in two orchards on the Huon, the pest had taken a firm hold, no less than 300 trees had been spoiled in one orchard. He did not know of any other remedy than that suggested by Mr. Kirk, which consisted of sprinkling the ground with tar-water. He had recently circulated, with the approval of the Treasurer, who was the head of the Agricultural Department in Tasmania, a schedule asking for information upon a number of pertinent questions. Something of this kind was, he thought, very much needed, in order to obtain information as to the different pests. He had received very few replies to his questions, the orchardists appearing to be unwilling to take any trouble in the matter.

Mr. STIEMB inquired what strength of kerosene spray was required for the mussel blight (*Mytilaspis pomorum*).

Mr. THOMPSON replied that the emulsion was prepared in this way:—To one gallon of milk, brought up to boiling point, add two gallons of kerosene.

Digitized by Google

If preferred they could use half a pound of soap to a gallon of water, brought to boiling point, and the kerosene churned in that for some time. This, with nine or ten times the quantity of water, could be effectively applied with a common cyclone-nozzle. He might mention a method of catching moths which he had found very successful. His father was a well know entomologist in England, and when they were travelling in Europe together they tried to obtain all the insect specimens they could. The method was a simple one, and he had frequently adopted it since. It was to boil equal proportions of molasses, sugar, or treacle, with the same quantity of stale ale or beer. This made a syrup, which, when spread upon a board, easily entangled a large variety of insects, and by this means they had obtained as many as fifteen different kinds in one evening. This plan, combined with a light hung in a tree, he had tried very successfully. The insects needed to be taken away quickly, for they soon recovered from their partial intoxication and flew away.

In reply to questions which were put to him, Mr. Thompson said that the best time for spraying trees was about the period of their blossoming. This was the most important time, but it should be repeated at intervals during the season. They had frequently discussed the question, whether there was more than one breeding of insects during the year, but they could obtain no decisive information. He was not prepared to say what was the best quantity of Paris green to use for spray, not having his note-book with him. A great deal of mischief had been caused by a mistake printed in an agricultural journal, and in which the proportion was given in pounds instead of in ounces. Early pruning and the kerosene emulsion were the best for killing the moth. He was not acquainted with wood-preserving oil, or unrefined kerosene, and therefore he had not used it. The pure article was very expensive, but if the oil possessed the qualities of kerosene it would answer every purpose. Mr. Maskell's book ("Scale-Insects") was the best he had come across. It was published by the New Zealand Government, and it gave remedies for the various pests. The fly blight which had been referred to was to be found in Tasmania, but the insect had hardly appeared in sufficient numbers to justify any remedy being sought.

Mr. THOMPSON stated that the moth, which had lately made its appearance in New Zealand, remained in the apple during all its metamorphoses; and it was impossible to detect any external flaw on the fruit, which upon being opened would be found to be totally destroyed.

The PRESIDENT thanked Mr. Thompson for the information he had afforded.

Mr. ADAMS asked if the Government had considered the question of adding to the Local Government Bill, in clause 23, which dealt with noxious plants, some provision by which the same restrictions would apply to noxious animals, birds, and other pests.

The PRESIDENT, in reply, stated that the whole question was under consideration.

Notes on Pests of Peach-trees.

A. G. HAMILTON, Mount Kembla.

THE following notes on insects and other pests infesting a few peach-trees under my observation may be of interest. When I first saw the trees in October, 1887, they were in a fairly healthy condition, although they had evidently not been pruned for some years. The soil is a dark brown mould, which hardens and cakes very soon after rain, and is then scarcely penetrable by a spade. The sub-soil is a yellow clay.

Digitized by Google

The ground round their roots was grass-grown, and had not been disturbed for a long time. The crop of fruit was a good one that year, but just before ripening was attacked by a small beetle—one of the *Rhynchophoridæ* or weevils. These insects ate shallow trenches all round the stalks of the peaches, and the injured flesh decaying, the peaches dropped; they also deposited their eggs, and the larvæ ate away patches, here and there, under the skin of the peach.

As the fruit became riper, another species of beetle—this time a *Clavicorn*—attacked it, depositing eggs just under the skin, where the larvæ developed, and ate away small galleries in all directions, forming decaying patches which soon rendered the peach uneatable. The perfect insects also burrowed into the pulp, sometimes as far as the stone. This beetle was about ¼ inch long, and $\frac{1}{12}$ wide. It was rather flattish, of a dark brown, with two dull reddish-brown spots at the extremities of the elytra. I regret to say that although I took many specimens I cannot now find one of either insect in my collection.

In 1888, about the first week of January, the leaves of all the trees were attacked by the fungus—*Uromyces Amygdali*—and before a month every leaf was thickly covered. The leaves all dropped off before the 1st of June. In the season of 1888–89 the fungus attacked the leaves as soon as they appeared, and indeed, in some instances, before they were unfolded, and by the middle of May few were left on the trees. The crop was not very large, and suffered from the two beetles as before.

Late in Autumn I dug round all the trees but one, a yellow mundy, and from that time till the present have put, once or twice a week, a bucketful of coal or wood ashes at the root of all but the yellow mundy. No pruning was done any year, except that several large branches of one tree, which obstructed the light, were sawn off.

In the season of 1889–90 the trees, from the mild winter and plentiful rains, began to flower in June, and kept it up to the usual time. This caused the crop of fruit to be small, as the weather, being continually wet, the bees did not frequent the blossoms, and they were imperfectly fertilised, a result to which the cold wet spring also contributed. But all the trees to which the ashes were applied showed no signs of *Uromyces*, had large luxuriant leaves, and kept them up till the latter end of June or the beginning of July; while the neglected one was as before infested with the fungus. This tree I look upon as a control experiment, and it may fairly be inferred that the potash supplied to the others was the ingredient, the absence of which caused the predisposition of the trees to the disease.

The yellow mundy tree above alluded to is a good instance of the evils resulting from neglected cicatrices of the bark on fruit trees. This tree had had a large piece of bark removed from the upper surface of one of the limbs in some way, and not being dressed the exposed wood died. On that part a large crop of a bright red fungus (a *Polyporus*, probably *P. sanguineus*) appeared in 1887. Since that time the fungus has appeared every year, and many of the smaller branches on the same limb gradually died off, while the interior of the limb affected had the appearance of wood attacked by dry rot—*Merulius lacrymaus*. It is evident that the spores of the *Polyporus* had found a resting-place and suitable nidus on the injured wood, and spread mycelium all through the branch. This same species is difficult to keep off dry wood. I have seen fine specimens growing year after year on the timbers of a railway bridge, although they were periodically coated with tar.

Digitized by Google

Many peach orchards in the Illawarra district are much troubled by mistletoe. Two species commonly grow on the trees:—*Viscum articulatum*, and *Loranthus celastroides*. The berries are eaten by birds, and the harder part afterwards voided on the trees, where they soon root. The trees which have these parasites evidently suffer from lowered vitality. The leaves are small and infested with yellows; the bark covered with lichens, principally a species of *Ramalina*, and the fruit poor in size, bitter in flavour, and few in number. Those trees which are nearest to brush or forest always suffer most.

Birds which are Enemies or Friends of Fruit-growers.

A. G. HAMILTON, Mount Kembla.

THE insectivorous birds which are of service or inimical to the fruit-grower belong almost entirely to the order of Passeres, or perchers, a few being of the Scansores, or climbers; while from the latter order come many injurious birds not at all insectivorous.

They may be divided into four groups:—

1. Those exclusively entomophagous and beneficial.
2. Those which feed to a large extent on insects, but on other substances as well; also beneficial.
3. Those eating both fruit and insects, and, hence, to some extent, harmful.
4. Those eating fruit and grain only—entirely hurtful. The majority of harmful species come from the third group, but it also supplies some which compensate for the harm they do in the fruit season by the amount of good done when it is not in season.

The following lists of the four groups give systematic and vernacular names, their distribution east or west of Dividing Range, and notes as to the degree of usefulness or the reverse. The information as to distribution I have compiled from a paper by Mr. A. J. North, F.L.S., entitled, "A List of the Birds found in the county of Cumberland, N.S.W." (Proc. of Linnean Society of N.S.W., Vol. III, 2nd Ser., p. 1772), and a list by Mr. J. D. Cox and myself, of Mudgee Birds.) (Ibid., Vol. IV, 2nd Ser., p. 395.)

I.—BIRDS EXCLUSIVELY INSECTIVOROUS.

	East of Range.	West of Range.
Aegotheles Novæ-Hollandiæ, V. & H.—Little night-jar. Not plentiful enough to be considered a friend	×	×
Eurostopodus guttatus, Vig. & Horsf.—Spotted night-jar	...	×
Eurostopodus albigularis, V. & H.—White-throated night-jar. The above remarks apply to these species also	×	...
Chætura caudacuta, Lath.—Spine-tailed swift	×	×
Cypselus pacificus, Lath.—Small swift	×	×
Hirundo neoxena, Q. & G.—Welcome swallow	×	×
Petrochelidon javanica, Sparr.—Tree-swallow	×	×
Lagenoplastes ariel, Gld., Fairy martin	×	×
Chœramœca leucosternon, Gld—White-winged martin. All these birds are indefatigable insect-destroyers, but the welcome swallow and the fairy martin, from their great numbers, may be placed highest in the list	×	×
Merops ornatus, Lath.—Bee-eater, sometimes called Kingfisher. Destroys quantities of insects, but, on the other hand, does much execution among bees at times	×	×
Eurystomus pacificus, Lath.—Dollar-bird	×	×
Artamus sordidus, Lath.	×	×

Digitized by Google

	East of Range.	West of Range.
Artamus leucopygialis, Gould	×	×
Artamus personatus, Gld.	×	×
Artamus minor, Viell.	...	...
Artamus superciliosus, Gld. All known as blue-larks, blue-martins, bush-martins, and bush-swallows. They are very useful birds, and coming as they do at times in vast flocks, must destroy enormous quantities of insects	×	×
Pardalotus punctatus, Temm.	×	×
Pardalotus striatus, Temm.	×	...
Pardalotus affinis, Gld.	×	×
Pardalotus assimilis, Ramsay	×	...
Pardalotus melanocephalus, Gld..—Diamond birds. These birds cling to twigs and branches, and search out insects concealed in crevices of the bark. The species *punctatus and affinis* are, perhaps, commonest	×	...
Grallina picata, Lath.—Peewit. A familiar bird, which I have heard accused of eating fruit. I do not think this is true, however	×	×
Pteropodocys phasianella, Gld.—Blue jay and spring bird. Not plentiful enough to be of great service	×	×
Campephaga jardinii, Rüpp.—Jardine's Campephaga	×	...
Campephaga rufiventris, Puch.—Red-vented Campephaga	×	×
Campephaga leucomela, V. & H.	×	...
Campephaga humeralis, Gld.—Magpie lark, peewit lark. Scarcely plentiful enough to do much good, and only summer visitants	×	×
Pachycephala gutturalis, Lath	×	×
Pachycephala rufiventris, Lath	×	×
Pachycephala olivacea, V. & H.—Thickheads. Active birds, which destroy many insects	×	×
Colluricincla harmonica, Lath.—Thrush	×	×
Colluricincla rufigaster, Gld.—Thrush. Destroy snails and larvæ of insects in quantities	...	×
Falcunculus frontatus, Lath.—Shrike, Crested shrike	×	×
Oreoica cristata, Lewin.—Shrike. Rather too shy to come in orchards. The last is sometimes called bell-bird.		
Chibia bracteata, Gld. Not common enough	×	...
Rhipidura albiscapa, Gld.—Fantail	×	×
Rhipidura rufirons, Lath.—Red-fronted fantail. The former species is a most useful bird	×	...
Sauloprocta motacilloides, V. & H.—Wagtail	×	×
Seisura inquieta, Lath.—Razor grinder. These birds are well known as insect-eating	×	×
Myiagra plumbea, V. & H.—Leaden-coloured fly-catcher	×	×
Myiagra rubecula, Lath. Both active insect-killers	×	×
Micræca fascinans, Lath.—Jackywinter. A familiar friend and useful bird	×	×
Monarcha carinata, S.W.	×	...
Monarcha Gouldii, G.R.Gr.	×	...
Gerygone albigularis, Gld.—Native canary	×	×
Gerygone fusca, Gld. Both useful birds	×	...
Smicrornis brevirostris, Gld.	×	×
Erythrodryas rosea, Gld.—Rose-fronted robin	...	...
Petræca multicolor, V. & H.—White-capped robin	×	×
Petræca Goodenovii, V. & H.—Red-capped robin	×	×
Petræca phœnicea, Gld.—Flame-breasted robin	–	×
Melanodryas cucullata, Lath.—Black-capped robin	×	×
Eopsaltria Australis, Lath.—Yellow-breasted robin. All the robins are useful birds, but the yellow-breasted is, perhaps, the most familiar, and therefore most useful	×	×
Menura superba, Dav.—Lyre-bird, pheasant. Too shy and cautious to venture close enough to orchards to do any good	...	...
Psophodes crepitans, V. & H.—Coach whip	×	...
Sphenostoma cristata, Gld.—Crested wedge-bill	×	...
Malurus cyaneus, Lath.—Blue wren, cocktail	×	×
Malurus Lambertii, V. & H.—Lambert's wren. All the *Maluri*, from their prying habits, are useful to the fruit-grower	×	...

Digitized by Google

	East of Range.	West of Range.
Amytis striatus, Gld.—Too rare to be very beneficial	×	...
Stipiturus malachurus, Lath.—The emu wren	×	...
Sphenura brachyptera, Lath.	×	...
Hylacola pyrrhopygia, V. & H. The same remark applies to the last three species	×	×
Acanthiza pusilla, Lath.	×	×
Acanthiza uropygialis, Gld.	×	...
Acanthiza nana, V. & H.	×	×
Acanthiza lineata, Gld.—All known as tom-tits. The first and last two species are well worthy of preservation, as they are active insect scavengers	×	×
Geobasileus reguloides, V. & H.	×	×
Geobasileus chrysorrhœa, Q. & G.—Tom-tits. Valuable birds, especially the first. In feeding their young they kill enormous quantities of larvæ	×	×
Ephthianura albifrons, J. & S.	×	×
Xerophila leucopsis, Gld. A very useful bird	×	×
Origma rubricata, Lath.—Rock bird, rock robin	×	×
Chthonicola sagittata, Lath.—Tit-lark	×	...
Anthus australis, V. & H.—Ground lark, pipit	×	×
Oreocincla lunulata, Lath.—Mountain thrush. Said to levy toll on fruit in return for its services in insect killing, but I have not observed this	×	...
Corcorax melanorhamphus, Viell.—Dollar bird, and black magpie	×	×
Struthidea cinerea, Gld.	×	...
Pomatostomus temporalis, V. & H.	×	...
Pomatostomus superciliosus, V. & H.	×	×
Pomatostomus ruficeps, Hartl. *Struthidea* and the *Pomatostomi* are well known under a variety of names, but the best known is that of the "Twelve Apostles," from their habit of going in flocks. The two first species of *Pomatostomus* are very useful birds	...	×
Climacteris scandens, Temm.—Woodpecker. From their bark-investigating habits, very useful birds	×	×
Climacteris leucophœa, Lath. The above remarks also apply to this species	×	×
Sittella chrysoptera, Lath.—Little woodpecker, creeper	×	×
Cacomantis pallida, Lath.—Common cuckoo	×	×
Cacomantis flabelliformus, Lath.—Rainbird, fantail cuckoo	×	×
Chalcites plagosus, Lath.—Bronze cuckoo	×	×
Chalcites basalis, Horof.—Bronze cuckoo. The last four, and indeed, all the cuckoos, are very destructive to insects	×	×
II.—BIRDS FEEDING PARTLY ON SMALL VERTEBRATES, BUT TO A LARGE EXTENT ON INSECTS.—ALL BENEFICIAL.		
Podargus strigoides, Lath.—Morepork, especially fond of large walking-stick insects (*Phasmidæ*)	×	×
Dacelo gigas, Bodd.—Laughing jackass	×	×
Halcyon sanctus, V. & H.—Sacred kingfisher	×	×
Halcyon pyrrhopygius, Gld.—Red-backed kingfisher	×	×
Halcyon Macleayi, T. & S.—Macleay's kingfisher. The above are all useful birds and worthy of preservation	×	×
Gymnorhina tibicen, Lath.—Magpie. A most indefatigable destroyer of insects. In the southern parts of the Colony its place is taken by the species common in Victoria—*G. leuconotus*, Gld., the white-backed magpie	×	×
Cracticus torquatus, Lath.—Butcher-bird	×	×
Cracticus robustus, Lath.—Magpie, butcher-bird. Both these are useful birds, but the former is the most useful from its familiar habits. The second species does not usually approach houses closely	×	×
Corvus australis, Gmelin.—The crow. This bird is also a great destroyer of insects, but is not looked on with favour in pastoral districts, on account of its killing young lambs, or by the careful hen-wife, as it is very apt to plunder the nests of hens and turkeys. But any one who has watched these birds on ploughed ground can have no doubt as to the enormous quantity of insects they devour	×	×

Digitized by Google

III.—Birds eating fruit as well as insects, and therefore more or less hurtful.

	East of Range.	West of Range.
Strepera graculina, White.—Black magpie, also rain bird. These birds follow the plough, and eat quantities of grubs, etc., and in the fruit season frequent orchards and devour cherries, grapes, and small fruits at a tremendous rate. They have also been accused, but unjustly, I think, of eating sown grain, and plucking wheat in the fields	×	×
Graucalus melanops, Lath.	×	×
Graucalus mentalis, V. & H.—Both called blue-jays. In orchards and vineyards destroy much fruit. One of the first species I had for a time would eat almost any fruit, but preferred grapes and water-melons cut in pieces	×	×
Ptilonorhynchus holosericus, Kuhl.—Satin-bird, bower-bird. Not very common west of the dividing range. Very fond of fruit, and does great damage. When no other fruit is ripe, they eat the berries of the introduced plant *Phytolacca octandra*, or as is locally named "inkweed"—the "pokeweed" of the United States	×	×
Mimeta viridis, Lath.—Green thrush or oriole. Very fond of fruit. Feeds on the cedar-berries when they are ripe. Very plentiful in the coast districts, but west of the mountains too rare to do much damage. Called wattle-bird in Illawarra district	×	×
Ptilotis penicillata, Gld.	×	×
Ptilotis fusca, Gld.—These destroy a good many grapes, by picking a hole and licking out the juice with their brush-like tongue. Even where much is not destroyed the appearance of the bunches is spoiled. The same remarks apply to the other species of honey-eaters (*Meliphagidæ*), but the birds below noted are much the worst as enemies of the orchard	×	×
Anthochæra carunculata, Lath.—The wattle-bird	×	×
Philemon corniculatus, Lath.—Leather-head	×	×
Philemon citreogularis, Gld.—Citron-throated leather-head	×	×
Entomyza cyanotis, Swainson.—Blue-head, green-back, green-baker	×	×
Myzantha garrula, Lath.—Soldier-bird, squeaker, minah, Miner; a perfect pest in vineyards	×	×
Zosterops cœrulescens, Lath.—Silver-eye*	×	×

IV.—Birds living on grain and fruit very destructive.

This list may be summed up in one word—Parrots.

* Although these little honey eaters are extremely destructive to grapes and stone fruit, they do an immense amount of good by clearing the trees of aphides in the winter and early spring. A flock of them will peep and pry about a leafless tree and in a short time clear it of many obnoxious insects.

Digitized by Google

The selection of Varieties of Fruit most suited to the respective Districts for Cultivation for Commercial Purposes.

Fruits adapted for our most Tropical districts.

WALTER S. CAMPBELL, Lismore.

The fruits which, up to the present moment have been considered by the Fruit Conference now sitting, are those which grow and succeed best in cold and temperate climates; but it must be remembered that we have in this Colony a warm semi-tropical nook where other kinds of fruit will succeed. This warm corner is the north-easternmost portion of the Colony, and is the most eastern portion of the continent of Australia. It is known as the Richmond River District and embraces the country watered by the Richmond, the Brunswick, and the Tweed Rivers.

Now, although, all the fruits spoken about at the Conference will grow admirably in this district, and some of them will produce excellent fruit, others will only produce sparingly, such as pears and apples in consequence, I imagine, of the winters being so mild that the trees are hardly deciduous, and do not obtain their natural winter's rest; therefore it stands to reason that the most profitable fruits to grow will be those that are natives of semi-tropical, or even of tropical countries. At the same time I may mention that peaches and nectarines produce excellent fruit and in abundance, but unfortunately this is generally completely destroyed before it ripens, by the larva of an insect; but I must except the early China peaches, which ripen apparently too early for the insects' eggs to develop. But for this pest the growing of these fruits should be extremely profitable, as ripe fruits could be placed on the markets of Sydney and Melbourne very much in advance of the same kinds of fruits from the colder and more southern districts. Our district is comparatively new, and up to the last few years, unknown, having become developed and made known through its adaptability for the growth of the sugar-cane; and, although the growing of cane is profitable in some parts of the district, it is beginning to be thought that other industries will be still more profitable, especially in localities remote from the central sugar mills, and a few settlers are considering the question of fruit-growing. But as a rule they know little or nothing about it, and would welcome any information as to what are the best fruits to grow, and how to grow them. The district may be said to be in an experimental stage with regard to semi-tropical and tropical fruits, although it is well known now how admirably the citrus or orange class succeeds. Oranges, lemons, limes, mandarins, cumquats, shaddocks grow and produce to perfection excellent fruit, which, in my opinion, is of superior flavour to that grown in Cumberland. At the Richmond River I have seen mandarins growing so thickly packed together on the branches that only the tips of the leaves could be seen, and a mass of golden fruit almost breaking down the trees. In many places I have seen

Digitized by Google

the trees growing wild; in good health and bearing heavily clean fruit, without a sign of scale. They appear to succeed best on the volcanic soil which forms a very large portion of the district (the other part sbeing alluvial, sandstone, and slate), although they succeed almost as well anywhere, but the alluvial formation is sometimes badly drained, and, of course, everyone who has had any experience with orange culture knows that drainage is absolutely essential to success. The volcanic soil, although retaining moisture sufficiently, is naturally well drained, in fact it can be ploughed or worked immediately after heavy rains. The trees have been generally grown from seed, possibly because of the difficulty of obtaining plants; but some say that grafted plants sucker terribly and that it is almost impossible to keep these suckers from growing. The seeds are sown almost anywhere after the soil is cleared of timber without any kind of preparation; and at best a ploughing. I shall be very much mistaken if this district does not produce, before many years are over, an immense quantity of oranges for export to other colonies or even to Europe. Many, if not most of the trees just at present grown, receive little or no cultivation. The seeds are stuck into the ground and allowed to grow without any bother at all. Fine healthy trees may be seen growing out of a dense mat of couch or buffalo grass, bearing fruit without scale or disease of any kind. I have long been under the impression that the native lime (Citrus australasica) would serve as a very suitable stalk for some kinds of orange or the lemon, as this plant grows very luxuriantly throughout the district in the brushes, and I am procuring seed, in order to give young stalks for experiment.

Notwithstanding the suitability of the Richmond River district for the orange, I feel certain that the export of oranges will take a second place to that of other semi-tropical, and, I might even say, some tropical fruits; and, with regard to these and their cultivation, the settlers require information badly. We, who have tried pine-apples, know they grow splendidly, and the fruit is of excellent quality and most juicy, and generally far surpassing those which are to be purchased in Sydney, and which are grown at Fiji or Queensland. Up to the present time, as far as I am aware, only one or two varieties are grown, but I feel pretty sure that other kinds will prove even better, and I am putting this to a practical test in procuring every variety I can from England, India, and other countries, besides seeds for planting and experimenting with on my own farm. Bananas, too, grow well and produce excellent fruit, some localities being better suited than others; and here again we require many varieties to try; and, notwithstanding the immense number brought from Fiji, I think, when the journey to Sydney is shortened to about eighteen or twenty hours, the growing of this fruit, even for the Sydney market, might be profitable. Notwithstanding the ease with which the plant can be grown, very few of the settlers seem to grow it, and bananas from Fiji may be seen in the fruit shops in the chief towns.

The common mango grows like a native plant, but it is very rarely seen. It is not the best variety by a very long way, and is the kind used in India as a stock to graft the good varieties upon. It is a somewhat difficult and a very expensive matter for a private individual to obtain plants of the high-class varieties, as I found to my cost, but I am procuring seeds from the district in India where they grow best, and it is not impossible that I may obtain good results. I think this fruit will be profitable to grow, and that the demand for the better kinds will be considerable when they become known.*

* NOTE.—The varieties which have proved best in Queensland are Alphonzo, Bengale, Gratissima, and Strawberry. Mr. Edgar, Curator of the Botanic Gardens, Rockhampton, has presented the Department with 100 of these trees which will be distributed amongst the growers in the Richmond River district.—EDITOR.

Digitized by Google

It is almost too much to hope for, but I think it probable that in some of the warmest localities even the mangosteen might be induced to grow and bear fruit. It is said to be the most delicious fruit in the world. The plants are very difficult to obtain; I managed to get two, but I am afraid one has been killed by the excessive wet; however, the other I have safe in Sydney for the present.

Guavas grow like weeds, and require but little care. I think the several varieties might be planted for profit and for the production of the much-esteemed guava jelly.

The Cape gooseberry is a weed in the district, but the ripe fruit is good, as many of the birds know, and so do the black gins, who collect it from the roadsides for sale to the white ladies who make excellent preserves from it. Mr. Peacock, the well-known jam manufacturer, in his evidence before the Victorian Select Committee on Vegetable Products, spoke most highly of the Cape gooseberry for preserving, and considered that if the fruit could be obtained in quantity there would be a great demand for the preserve. Personally, I prefer it to almost any other kind of preserve.

The Japanese persimmon grows well, and, I believe, will produce first-class fruit; but I have not yet seen it in bearing. I am doubtful about this fruit becoming a general favourite, and I do not think it would be wise to plant too largely and expect to obtain the present high market prices.

There have been several kinds of Japanese plums introduced of late years into California, which I think would be well adapted to the Richmond River district, notably one named the Kelsey plum.* The Californian papers speak most highly of this variety, and it is said to be wonderfully prolific, but I do not think plants can be procured in this Colony.

I have no doubt that there are other fruits in Japan that might be well worth introducing into the Colony, especially for the warm districts.

Strawberries succeed admirably, and I believe fruit could be produced very early at times when this fruit brings a very high price in the market; but we must learn how to pack them for a sea voyage; but the sea voyage to Sydney is a trifle compared to the long distances this soft fruit has to travel to American and European markets, where it is delivered in perfect order. The growing of such a kind of fruit, I am afraid, will be looked upon as a "mean occupation" by some of the settlers; I have heard many suggest this and laugh at the idea. Cane, corn, or dairying is the thing; it is big and you can use a plough; tinkering with small fruits is only fit for Chinamen.

The Queensland nut (*Macadamia ternifolia*) is indigenous to the district, and grows to a considerable size, but it does not seem to be protected or to be grown for its nuts, but is cleared off, I am sorry to say, like the rest of the timber. It seems to me that a market might be found for it, as it is a very pleasant nut to eat.

The custard apple and cherymoyer succeed admirably, but they are very little grown; apparently little known. These fruits sometimes bring a very large price in the market in Sydney.

The pea-nut plant (*Arachis hypogæa*) produces excellent nuts. It is an annual, and bears its nuts underground. This should be a profitable plant to cultivate, for it is not only of use as a nut to eat, but a very excellent oil can be obtained from it, an oil frequently used to adulterate olive oil. The oilcake is used for fattening cattle.

* Note.—This very fine plum is thriving at Gosford and Springwood; and large numbers have been grafted on old sorts; it may now be obtained from several nurserymen both here and in Victoria.—Editor.

Digitized by Google

The common passion-fruit grows wild, and competes successfully with the luxuriant growth of the indigenous creepers. I have seen it growing in dense masses along the road-sides for miles, and have frequently come across it in the dense scrubs. Its fruit ripens earlier than that of the passion-fruit cultivated about Cumberland. The more delicate and large fruiting varieties should grow and fruit as well as they do in Queensland.

The bhel fruit (*Ægle marmelos*), sometimes called the Bengal apple or quince, is a fruit that should be introduced, if only for its medicinal properties. My attention was directed to the plant some years ago by a medical gentleman, who had lived for some time in India; and it is only within the last few months that I have succeeded in obtaining seed, which I intend to try. The fruit is much liked by those accustomed to it. It is nutritious, warm, and cathartic; in taste, delicious; in fragrance, exquisite; its aperient and detersive qualities, and its efficacy in removing habitual costiveness have been proved by constant experience. It belongs to the Aurantiaceæ, the same order as the orange.

The pawpaw tree (*Carica papaya*) grows well and fruits well. The fruit is somewhat like a rock-melon, and is altogether a strange fruit, disagreeable in odour, but said to be very wholesome, and is greatly liked by persons who become used to it. The juice of the unripe fruit has the peculiar property of causing tough meat to become tender.

I think I may include coffee amongst the fruits. This succeeds admirably in the two or three localities where a plant or two have been tried. It should be planted by every settler, who can grow, without any trouble, enough berries for his own requirements. It is doubtful whether coffee can be grown profitably on a large scale, owing to the scarcity of suitable labour. The coffee-tree is well worth growing for its beautiful appearance alone, for when laden with thousands of bright red berries it is a most charming object.

Some varieties of grapes succeed very well, especially the Isabella, which grows like an indigenous plant. The Italians, at the little settlement called New Italy, who cultivate the inferior soil (which is very similar to the soil about Cumberland), between the Richmond and Clarence Rivers, grow a good many table grapes for local sale, but I cannot say what the varieties are. As grapes ripen earlier than they do in the vicinity of Sydney, they might perhaps be grown profitably for southern markets; but experiments must be made to test the suitability of varieties for climate and soils.

Tomatoes, which may be classed as fruits, have become weeds in some localities, but the fruit, although excellent, as regards flavour, is small. The improved varieties could be grown with profit, as the fruit ripens very early, and tomatoes are always in demand, and at certain periods of the year bring good prices.

There are many other kinds of fruits of lesser importance, the names of which I might very well have added to those mentioned, but I fear I have already exceeded my time. Of course, in this trifling contribution of mine to the Fruit Conference, it has been only possible to skim over the subject, as it were; and I would greatly have preferred that someone more able to do justice to it had taken the matter in hand. However, my effort may possibly direct attention to that which may grow into an important industry, likely to add to the prosperity of our country.

I wish to remark, before concluding, that we, who are attempting the cultivation of tropical and semi-tropical fruits, are struggling at present against the many difficulties common to pioneers in new districts. We do not yet understand what our various soils are capable of producing, nor do

Digitized by Google

we properly understand our different climates, and one great difficulty I think I am justified in mentioning is the impossibility of procuring in the Colony many of the foreign plants which we are anxious to acclimatise if possible; and I think that this is a matter that might fairly be considered by the Agricultural Department, which has the power of obtaining supplies of any fruits or economic plants from any part of the world, and of distributing them at a nominal price to anyone able and anxious to grow them.

The Varieties of Fruit most suitable for growing in the Fairfield District, County of Cumberland.

W. STIMSON, Fairfield.

In reference to the above subject I find that the orange and lemon do not thrive well on the lower portions of the Fairfield district, but on the higher land, 2 or 3 miles north of Fairfield, they do fairly well when planted on the eastern and northern slopes of the ridges. The district is as well adapted for the growth of grapes as any in the Colony. Among those which do best for table purposes are the Black Hambro (1), Muscat of Alexandria, and the late Sherry and Hambro, late varieties.

The Madeira, Chasselas, White Sherry, and Black Hermitage are about the best suited for wine-making.

Nearly all English fruits do well. Those varieties of apples which do best are, the Five-crown Pippin, Mobbs' Royal, Nickajack, Winter Pearmain, White Winter Pearmain, Smith's Early Red, Smith's Late Green, Alexander, Royal Russet, and Trivett's Seedling.

Of pears, Brown and White Bergamots, Winter Nelis, Williams' Bon-crétien, Marie Louise, and Jargonelle varieties do very well.

The most suitable peaches are Briggs' Red May, Late Newington, Royal George, Lady Palmerston, Large Red Shanghai, and Yellow Italian.

Apricots.—Moor Park, Temple's, Camden Superb, and Large Red.

Nectarines.—Rivers' Orange, Napoleon, and Stanwick.

Plums.—Purple Cluster and Loutherborough.

The May Duke Cherry bears well in moist, stony ground.

Brown Turkey and Hills Large Brown are the most suitable varieties of figs.

During a period of thirty years I have found the above fruits best adapted for the Fairfield district. Many other varieties have been tried, but were found unsuited to the soil. The strawberry can be grown profitably, as it is possible to gather them in the season and place them in the Sydney market in little over an hour. The same with other fruits, and this, I think, is where the Central Cumberland district has an advantage over more distant places, although our land is far more expensive to cultivate than that in many of those districts. Besides, not only do we save freight but our fruit is not subjected to the long land carriage, which always does more or less damage to soft ripe fruit, and lessens its value before it reaches the market, while often it is rendered altogether unsaleable. When fruit arrives in the market in first-class condition it is eagerly sought for by the consumers, even at a high price. It would be a great advantage to have suitable commodious markets in a situation convenient for all concerned. Then not only would the grower be able to place his fruit to the best advantage, and get a good return for his labour, but the consumer would be able to obtain good, sound, wholesome fruit.

Digitized by Google

Mr. STIEME, Fairfield, in discussing the papers, said that Mr. Campbell's observations confirmed what he had said early in the proceedings, namely, that the climate of New South Wales was sufficiently diversified to enable all varieties of fruit to be grown. He suggested that the delegates should each write out a list of the plants which did or did not thrive in their districts. By this means they would be able to institute a comparison which would be of great value; they would be able to ascertain the capabilities of the soil and climate in the different districts, and it would also be a guide to them in the selection of fruits for those localities. This was more a matter for individual members than for the Conference to undertake.

Mr. CLEGHORN, Uralla, said that proximity to Sydney seemed to be the great reason for the cultivation of fruit in Central Cumberland rather than suitability of climate. He considered that every district should be encouraged in growing the fruit which best suited it, regardless of its nearest markets. It was only fair that the railways of the Colony, which were the main roads to the country, should be in a position to carry the products of the country to any market. In the New England district, if they wished to have grapes, they would have to grow them under glass. They should leave these to be grown in districts more suitable for their cultivation. The trees which grew best in New England were those which required a long winter rest, such as cherries and plums. The only difficulties in the way of their extensively cultivating this class of fruit were the freight charges which prevented its distribution over the Colony.

Mr. SPURWAY, Orange, said that in the Orange district the Florence, Green-heart, Napoleon, and Figaro cherries were all good bearers. He had trees, only eleven years planted, which yielded 4 cwt. of fruit. The apples could not be surpassed in any district in the country. Plums, pears, and quinces could also be profitably grown. With respect to the question of models he would point out that apples assumed different shapes in different districts, and were hardly recognisable as the same variety.

Mr. LANSDOWNE, Goulburn, said that the varieties of cherries which grew best at Goulburn were the Napoleon and the St. Margaret; and of the plums, Washington and Coe's Late Red. Quinces and all varieties of apples did well, though the latter varied much in colour and flavour.

The DIRECTOR pointed out the need of a proper nomenclature for fruits. They wanted both a collection of fruits and collated evidence as to the varieties which did best in the different districts; and to obtain this he had sent out circulars to some 200 fruit-growers. He asked them to inform him which fruits flourished best with them, and which were considered most suitable for commercial purposes; and he further asked the nature of the formation of the surface and subsoil, recognising how much this affected the growth of fruit. He likewise inquired the height of each district above sea-level, climatic influences, rainfall, &c. When this information came to hand it would be collated and published as an appendix to the report of the Conference, and should prove of much value to the Colony.

Mr. BRIDLE, Tumut, stated that all varieties of English fruits flourished at Tumut. The quality of the land in the district varied, but fruit grown in a chocolate soil was found to be better, and to keep longer than that grown in soil of a poorer quality.

Mr. VIVIAN, M.L.A., Manning River, endorsed what Mr. Bridle had said with reference to the excellence of the fruit grown at Tumut. An attempt, he said, had been made to manufacture cider, but with little success. This industry, if cultivated, would be a good thing for the Colony.

Digitized by Google

Improved Methods of Packing and Transport, and Market Accommodation for Fruit.

Export of Oranges and experience thereon.

C. B. CAIRNES, Parramatta.

I WILL endeavour to give a brief sketch of the labours of myself and others to institute an export trade with Europe and India for the disposal of our surplus oranges and apples:—

In June, 1880, I shipped to Dublin, per s.s. "Garonne," one cask of oranges and lemons, which reached their destination in seventy-nine days, "in excellent order," without the loss of a single orange and only two lemons bad.

These fruits were carefully picked in the orchard of Mr. Acres, placed on straw in a dray, and brought to me. I laid them on the floor of a large, dry, airy room into which the sun shone brightly, where they remained for several days, until I packed them. My process was as follows:—After carefully sorting out any defective fruit, I took an ordinary bottled ale cask, and bored with an inch bit air holes up the sides. I then placed a layer of wheat or barley husks in the bottom, and on this, tightly packed first layer of fruit, next shook the husks over them, so as to fill all the interstices, and make a bed for No. 2 layer. When the cask was half filled I boarded it across, so as to divide the weight of fruit, and then completed packing. These oranges, on arrival, were submitted for inspection of various dealers in Dublin and were highly approved of.

Mr. Owen Jones, of Baulkham Hills, on 18th June, 1883, picked and packed in his own orchard two casks of Oranges, following my instructions. These oranges were packed in exactly the same manner as those I sent in 1880. Mr. Jones took these two casks with him to Wales, where they were opened seventy-four days after being cut from the trees. He wrote me: "They were in fine condition, and when I left, a month after, they looked just as well as when picked off the tree; the oranges, though rough skinned, were much admired."

In consequence of the advice of our London brokers, Messrs. Keeling and Hunt, the system of packing with chaff or husks in casks was abandoned, and cases of various designs were adopted. Twenty half-boxes, known here as packers or Hobart boxes, were consigned by me, per "Cuzco" in 1883, on account of Mr. G. Hollier, and realised in London, 7th September, 1883, £10 5s. gross, or 6s. 9d. net. In 1886 200 similar boxes, consigned per "Sorata," on account of Mr. E. H. Acres, and sold on 25th September, realised £80 14s. 5d. gross.

These shipments, which were regarded as very satisfactory, were all carried in cool airy spaces on board.

Digitized by Google

I have now described our successes, but must not ignore our failures, which were caused by improper treatment on shipboard, indifferent packing, and in the case of consignments in 1887, a cold, wet autumn, which made all citrus fruits difficult of carriage.

As illustrative of what I designate as improper treatment on board I will cite the following:—One steamer, which took very large consignments as ordinary cargo, also took as passenger Mr. Thomas Radbrou, of Field of Mars, fruit-grower. I asked this gentleman to watch the transit of the fruit to London, and favour me with his report on the treatment it received. He informed me that for three weeks from leaving Sydney the hatches were never opened. He spoke to the mate on the necessity of admitting air to the fruit, and in consequence of his doing so the hatch was opened in the presence of Mr. Radbrou, who stated that the stench which ascended from the hold caused by rotting oranges would almost knock you down.

In 1887 the cold chambers of various steamers were used for transit of large quantities of oranges, consigned by Messrs. Acres, Griffiths, Hollier, Luke, M'Roberts, and small consignments by various growers, the results being partial and complete failures. One steamer landed the entire cargo partly frozen, and occasioned loss, not only to the consignees but to the buyers, who found them apparently fresh looking fruit, no more lasting than so many lumps of ice, and as a consequence our market for succeeding shipments was spoilt. The shippers were completely disheartened, and for the time being the wished-for trade with the mother land was smothered.

Packing was in many consignments faulty, but not in all, a notable exception being by Mr. Watkins, of Toongabbie, who so carefully followed out the instructions on packing I conveyed to him as to elicit the following complimentary remarks from Messrs. Keeling and Hunt:—"We highly commend the selection and style of packing adopted by Mr. Watkins, and are still of opinion that from Australia this package, packing, &c., cannot be improved upon."

This consignment, owing to difficulty in obtaining carriage, was detained here six weeks before shipment on "Chimboraza;" yet, in the face of this severe test, the fruit sold for 12s. per case of 240 oranges.

For full particulars as to Nos. 1 and 2, Cairnes' cases, which were the ones referred to, also mode of packing, I would ask those interested to refer to Report of Royal Commission on Vegetable Products, in Victoria, in which my evidence was given before Messrs. T. K. Dow, D. Martin, and Joseph Knight, on 24th April, 1888, commencing No. 9564. This highly meritorious and interesting publication can be purchased from Mr. J. Shillingshaw, Secretary Royal Commission Vegetable Products, Melbourne, and should be read by every member of this Conference.

I have this year been favoured with a visit from Mr. Butler, who for many years has acted as buyer for the large firm of J. Solomon & Co., fruit dealers, of Piccadilly, London. He informed me that as the result of his recent experience in bringing out English fruits to Australia that, with proper packing and careful attention on board, oranges ought to be landed in London in good marketable condition. He recommended a temperature of 44 degrees being maintained, perfect ventilation, and the use of a case similar to the Hobart apple case, but the boards should be dressed or smooth inside, to prevent rubbing the tissue paper wraps or fruit. I tried two shipments to the Indian market. That to Bombay was encouraging, if direct and speedy transit there could be obtained, but trans-shipment at Ceylon, and exposure of the fruit on the wharf to a tropical heat, while waiting for the steamer to convey it into Bombay, would be fatal to any consignment. Our venture to Calcutta

Digitized by Google

per s.s. "Clitus" was also a failure, 334 packing cases selling, on 19th October, 1887, for £46 8s. gross, as per Messrs. Mackenzie, Lyall, & Co.'s account sales. These fruits when shipped were rather too ripe. They arrived during an Indian festival, and were allowed to remain exposed to tropical heat. When sold a large proportion were bad. Consequently, neither of these shipments can be considered as fair tests of this valuable market. We were advised not to ship for arrival at Calcutta later than August and September.

Messrs. Blackburys & Co. furnished me with very encouraging reports as to the firm markets that awaited our citrus fruits in Antwerp and Hamburgh.

The question I would now submit for consideration of the Conference is, were our oranges packed and carried in the best possible manner, so as to lead us to the conclusion that an export of our citrus fruits to Europe cannot be accomplished with success? To this question I must decidedly answer no. I believe that we are practically ignorant of the method of curing fruit so as to enable it to stand the effects of a long voyage. What exporter has cut each fruit from the tree, handling it as tenderly as an egg, then exposing the fruit to the action of the sunshine daily, until the orange skin became toughened and superfluous moisture extracted, and not until this stage was reached wrapping the oranges and packing them lightly in their cases. Yet if my memory is correct Mr. James Inglis, M.L.A., in a lecture delivered some years ago in Parramatta, stated that something like what I have related was the procedure carried out in Sicily in preparing oranges and lemons for the American market, to which large quantities are annually exported, not by passenger steamers, but specially fitted up fruit-carrying steamers.

The question of chartering special steamers for carriage of Australian fruits has this year been raised in London by the fruit importers, and the satisfactory returns received for Tasmanian apples per "Oceana" and "Liguria" plainly point to the great trade that awaits such an enterprise.

Few persons outside the fruit-grower and dealer have the remotest idea of the enormous annual loss of oranges in the county of Cumberland during the months of May, June, and July, for want of a market. In 1887 I was credibly informed that one large grower had not less than 10,000 cases rotting under his trees. This year the crop is in many orchards a very heavy one, and in the less elevated districts the fruit is now falling fast, and almost unsaleable in our Sydney market. I might safely affirm that 100,000 cases could easily be purchased on the trees at present for 2s. per case, the larger proportion of which must perish. If the trees could be judiciously thinned of a portion of their crops, and this fruit sold even at 2s. per case, it appears to me that those left on the trees ought to mature better, and when our markets are active in spring and summer a higher price should be obtained for them.

I recently visited an orchard of large seedling orange trees; the fruit was fine, firm, and good; the owner estimated the crop on 10 acres at 5,000 cases, or five cases per tree. The fruit is falling and no market for them at present.

Our county of Cumberland is a rich and prosperous one, and if we could only dispose of at reasonable prices the fruits it is capable of producing, I think it would be difficult to find a more highly favoured district. It is with this object in view that I have done my best to try and accomplish that desirable end, and if others and myself have so far failed, we can at least comfort ourselves with the reflection that we have endeavoured to do our duty as colonists, and have paved the way for others to profit by the experience and information we have obtained, in our infant efforts to export to the old land the surplus fruits with which we are blessed.

Digitized by Google

European Markets for Australian Wines, and packing Oranges and Grapes for Export.

J. PLUMMER, Sydney.

1. *European markets for Australian Wines.*

WHEN Australian wines were first introduced into the United Kingdom the present taste for light wines did not exist, the heavy duties imposed on imported wines preventing them from being offered at even a moderate rate. The popular taste for light wines in England began with the lowering of the duties upon French clarets, the increased consumption of which was thought by Mr. Gladstone as being likely to aid in diminishing the consumption of ardent spirits.

About this time samples of Australian wines were placed in the market by Messrs. Auld, Burgoyne, and other Australian vignerons and their agents, but for a long time they were confounded with the South African sherries and other inferior wines from the Cape of Good Hope, which had fallen into disfavour by reason of their unsound character.

Subsequently Mr. Daniel Tallerman, with whom I was for some years associated, made several vigorous but only partially successful attempts to bring Australian wines into notice. He was followed by the late Mr. Fallon, of Albury, who experienced considerable difficulty in finding purchasers for small quantities of even his best wines, their high natural alcoholic strength leading to the impression that they were "fortified." So prevalent was this idea that when arranging with Lord Sherbrook (then Mr. Robert Lowe) to receive, as Chancellor of the Exchequer, a deputation of Australian representatives, including Mr. Fallon and Mr. Alexander M'Arthur, on the subject of altering the wines duties, I found it almost impossible to convince him that, even with all his Australian knowledge and experience, Australia could produce sound wines which did not require "fortifying" with spirit.

A few weeks afterwards, when Mr. Fallon read before the Royal Colonial Institute a paper on the subject of Australian wines and the difficulties with which they had to contend, he was attacked by the late Mr. William Forster, then Agent-General for New South Wales, who said that Australia had never produced any good wine, and would not be enabled to export any for a long time to come. This was a most impolitic utterance, even if it had been based upon truth, and led to a rather warm debate.

The Paris and South Kensington International Exhibitions, which preceded that at the Garden Palace in 1879, afforded the first real opportunities for testing Australian wines on their own merits, and the attention of French and German vignerons became directed to Australia as a possible source of supply for blending purposes. The Indian and Colonial Exhibition in London, and the recent International Exhibition in Paris, aided yet more largely in making the excellent qualities of Australian wines better known, and at the present moment the future of the industry lies virtually in the hands of the wine-growers themselves.

So much for the history of the movement. Now for a few of the mistakes connected with it.

While some of the earlier samples sent out were of good quality, others were decidedly bad, wholly unfit to drink, and should have been thrown away. Instead of doing this, they were doctored with cheap brandy, a trick speedily detected, and became justly regarded as a spurious article. Then, when it was rumoured in Australia that Australian wines were finding

Digitized by Google

a market in London, considerable quantities of immatured and unsaleable stuff were sent over to the great disgust of those engaged in building up the trade, and who speedily found that one bottle of inferior wine did more harm than a hundred bottles of sound wine did good. At a banquet given to the Duke of Edinburgh, in the Freemasons' Tavern, London, on the occasion of his return from Australia, the wines on the table were all from Australian vineyards, but while some were of excellent quality others were so bad that the guests ordered the waiters to take them away and bring port and sherry in their stead. I, myself, have seen a hogshead of Australian wine sold in London at the rate of eightpence a gallon.

During Mr. Fallon's stay in London I was frequently associated with him in the work of preparing his lectures and letters to the press, and subsequently in his correspondence with some of the leading London wine merchants, my impression being that he would do better to arrange with an old established house in the wine trade to act as his agent than to establish an independent agency. But the replies received by us were to the effect that while the samples submitted by Mr. Fallon were of undoubted excellence, the general character of Australian wines was not such as would justify them in increasing the number of their brands.

It has been everywhere the same. Side by side with wines of undoubted high quality there have been introduced real or spurious Australian wines not worth the cost or trouble of bottling. Thanks to efforts made by some of the leading Victorian and South Australian vignerons, the mischief has become largely counteracted within the last few years, and the demand for pure Australian wines is steadily on the increase.

But it appears to me that if a federal association of vignerons could be established, having branch organisations in each of the wine-producing colonies, something might be done in the way of placing the better wines in the European markets by affording guarantees of their quality. There has been too much isolated action, too much rivalry with existing interests. As a rule, the British wine-merchant sets his face against Australian wine, not because he has any real objection to the article but because its representatives enter into active and sometimes unfair rivalry with him. Of course they have a perfect right to do so, but the policy of such a course is another matter.

If a confederation of Australian vignerons were established they could successfully open agencies in all the leading cities in Europe for the sale of Australian wines in limited quantities or in bulk, many of the leading wine merchants at present indisposed to treat with individual vignerons being readily open to negotiations with a powerful confederacy.

Many of the white wines on sale in Sydney or Melbourne would find a ready sale on the continent, if properly placed. I remember a bottle of Fallon's Reisling being produced by some Australians in a *Café* on the Boulevard des Italiens, in Paris, when it was pronounced to be excellent by several French epicures, who denied the possibility of its being of Australian origin until they were undeceived by a visit to the New South Wales Court, in the Paris Exhibition.

My opinion, based upon my experiences with Mr. Tallermann and Mr. Fallon—now that the prejudice against Australian wines is becoming removed—is that a market can be found in Europe for every gallon of first-class wine Australia can produce, if the inferior articles can be kept out of the field, the tastes of each country or large city are carefully studied, and, where possible, established houses employed as agents in preference to opening new agencies.

Digitized by Google

2. *Packing Oranges and Grapes for Export.*

Although many improvements in packing oranges for export have been suggested from time to time the system adopted in connection with the export of oranges from Spanish ports to London remains much the same as it was thirty or forty years ago. From boyhood I have been familiar with the details of the London trade, from the moment the steamers were berthed at the wharfs in Lower Thames-street to that when the fruit reached the hands of the retailers, and have seen every attempted improvement in packing up to the time I left London for Sydney.

Fifty years ago the oranges were brought from Spain to London by sailing vessel, but in consequence of the length of the voyage a considerable proportion of the fruit arrived in unsound condition, cart-loads of decayed oranges found in the cases being taken away almost daily from Mitre-street, Aldgate, then the great market from which the majority of London retail dealers obtained their supplies. The loss was so great that at times it affected the prices of the fruit, but no remedy could be suggested, save that over-ripe fruit should not be packed. The cases were then, as now, made of thin pine wood, each case holding from 420 to 490 oranges. The oranges were supposed to be packed before they were fully ripe, and in a perfectly dry condition. No attempt was made to render the cases air-tight, but they were expected to be stowed away in cool, dry places. When these conditions were complied with, the bulk of the fruit invariably arrived in London in good condition.

About 1855 steam vessels began to be employed in the trade, which rapidly assumed large dimensions in consequence of the increased facilities afforded, the supply of oranges commencing earlier and terminating later by reason of the greater rapidity with which the voyages were made, while the increased certainty in the dates of arrival enabled Messrs. Keeling and Hunt and other agents to arrange for the more speedy disposal of the fruit when it reached their hands. So perfect has the system now become that the work of distribution, of sending the fruit to Manchester, Birmingham, and elsewhere, is often partially completed before the last case has left the ship.

Owing to the greater care observed in the packing and the more speedy methods of transit the percentage of unsound fruit is comparatively small. The oranges may be roughly divided into two classes—the thin-skinned and the thick-skinned. The former are invariably wrapped in tissue paper imported from France, but considerable quantities of the latter, during the early part of the season, are packed without any such protection. The oranges, as they are brought to be packed, are roughly examined by the overlooker, who turns back any suspicious-looking baskets. As the packers put the oranges into the cases, which is accomplished with great dexterity and speed, any moist or unsound fruit is discarded and thrown into a receptacle, which is removed immediately it becomes filled. The rapidity with which each orange is wrapped in paper and thrown into the case is something marvellous.

The paper used for wrapping the fruit is something like the "whitey-brown" paper with which shopkeepers are familiar, but is very cheaply produced, so that the cost of wrapping the oranges does not add greatly to the expense of packing, and is more than counterbalanced by the certainty of the fruit reaching its destination in fairly good condition. When a case is filled the upper part is covered with thin strips of pine-wood, which are firmly fastened down with such skill that the oranges are rarely if ever bruised.

Digitized by Google

Considerable quantities of oranges thus packed are sent to the United States. The fruit which is not used for export is forwarded to the marmalade factories or sent into the city markets. On being taken on board ship the cases are placed on end in cool, dry chambers, and in such a manner that none are crushed by the weight of those above them. On reaching the wharf at London they are unshipped by a special class of labourers, who have, from long practice, acquired considerable skill in the work of unloading. Each case, as it is lifted out of the ship's hold, is carried away by a labourer with the aid of a "porter's knot" to the warehouse or vehicle for which it is destined, and deposited safely without any unnecessary knocking about.

Very different is the manner in which large quantities of oranges are exported from Sydney. They are often packed unsystematically together in small cases, two or three of which are sometimes carried at one time by a single labourer, and are frequently made to form portion of the deck cargo, insufficiently protected from the rain and sea water.

Much of the Australian fruit is equal to the bulk of that found in the London market, and were it to be packed and shipped in the same manner as are the Spanish oranges there is no reason why a large export trade with England should not spring up. At the present time the annual export of oranges from Spain amounts to several million cases.

Messrs. Keeling and Hunt, some little time ago, published a series of hints to those desirous of beginning an export trade in oranges, but their suggestions do not seem to have received the attention they deserved, although the firm is the largest establishment of its kind in the world, hundreds of thousands of cases passing through its hands in the course of a single year.

During the late rainy season the grape supply of Sydney fell short, and large quantities of the fruit were imported from Adelaide and elsewhere. The imported fruit could readily be detected by the quantity of sawdust which clung to it, and which was found difficult to remove. This was occasioned by the grapes or sawdust, or both, being somewhat damp when packed, and also by the sawdust being pressed too closely.

In Spain pine sawdust is used. It is kept perfectly dry until required for use. The boxes contain from 10 to 12 lb. of grapes each. The fruit is packed perfectly dry, with the bloom on, no more sawdust being used than is sufficient to prevent the grapes from being injured as the boxes are moved about.

When the boxes come into the hands of the retailers they are carefully opened, and the grapes, being taken out, are placed in clean sheets of paper, and the sawdust with the aid of a pair of bellows removed, the bloom on the grapes remaining untouched. These grapes are retailed at from 9d. to 18d. per lb., according to size and quality, the demand being greatest during the winter months. When properly packed and kept dry they will remain sound for two or three months.

Improved methods of transport for Fruit.

W. CLEGHORN, Uralla.

It will be at once admitted that the conveyance of fruit, or any other commodity to the final consumer, from wherever it is grown or obtained, is an important and essential part of production, and however abundant an article may be in any district it is of little or no commercial value if the cost of conveying it to where it is wanted absorbs a large part, or the whole

Digitized by Google

value. This is, unfortunately, the position in which fruit-growers on the table-land of New England find themselves placed under our present railway system, in respect to small parcels of fruit. Large parcels of fruit, I may state, are carried by rail at reasonable rates—but there are thousands of families throughout the country, as well as in Sydney and other towns, who very naturally desire to have an abundant and cheap supply of cool and ripe fruit, especially during the hot summer months. Fruit dealers also would prefer to have regular daily consignments, in small quantities, of such perishable fruits as cherries, strawberries, plums, and the like, which are produced in abundance and to perfection on the high lands of New England. The growers there are willing and anxious to supply this demand, but the railway authorities refuse to aid or help the fruit-growers to attain this object, by demanding excessive and prohibitive rates of carriage. That the growers are prohibited from disposing of fruit in small lots may be gathered from the fact that the railway charge from Uralla to Sydney for a 20-lb. box of cherries is the same as for 2½ cwt.; and the same for a single case of apples as for 4½ cwt. The charge in the first case being 3s., and for a single case of apples 5s. The result is that while these fruits are often selling at very high prices in Sydney, the grower has to accept a very small part of the value; or if sent in large quantities to wholesale dealers who sell again to retailers, the profits claimed by each of these parties greatly enhances the cost to the consumer, in which the producer has a very small share. This is a matter that has been and must continue to be impressed on the Railway Commissioners, as it can be shown that the high rates charged on parcels is quite indefensible. We have a right to assume that the cost of running a train is entirely regulated by weight and distance. If we therefore take the average weight of a first-class passenger with luggage at 260 lb., which is equal to thirty-seven 7-lb. boxes of fruit at 1s. 9d. for 350 miles—such being fruit rate, or 50 per cent. off parcel rates—the charge for carrying the same in the guard's van is £3 4s. 9d., while a first-class passenger is carried the same distance for £3 3s.; or eighteen 14-lb. boxes, equal to 250 lb., are charged more for the same distance than a second-class passenger. It is self evident that no trade can be conducted from distant inland stations to Sydney at these rates, ranging from £20 to £30 a ton, and that a complete revision of rates is urgently needed. That such can and should be done is very evident from the fact that a parcel can be sent hundreds of miles by rail to London, and then by mail-steamer to Sydney, and then by mail-train to the most distant town in the Colony for a less rate of carriage than the very same parcel would be charged for if sent by rail inland from Sydney only. Many country industries cannot even exist, much less prosper, under the present system of railway management. English fruit-growers have stated that the introduction of the parcel-post system there has been one of the greatest boons ever conferred upon their industry—as they are now enabled to send daily, if necessary, small boxes of fruit direct to consumers at small cost, by which means the growers obtain much better prices, while the consumer gets fresh choice fruit every day for dessert at a much less price than formerly. By greatly reducing the railway charges on small lots of fruit I feel certain that great benefit would be conferred on inland fruit-growers, especially in districts like New England, where all kinds of English fruits grow to perfection, and residents in Sydney would quickly appreciate the advantage of having cool fresh fruits placed on their table every day at reasonable cost, plucked direct from the tree, and without being subjected to the frequent and many times very undesirable handling—unavoidable under the present system. Owing to the large area of land now being

Digitized by Google

planted in fruit-trees, the present would be the most opportune time to make the desired change, because the trade could for the present be met by existing appliances, and be gradually extended as it increases, for it is a trade that must inevitably assume large dimensions within a very few years.

Transport of Fruit.

JAMES BEATTIE, Wagga Wagga.

THAT the facilities for the conveyance of fruit from country districts are most unsatisfactory is well known, and keenly felt, by all fruit-growers in distant localities.

As far as the soft and more perishable kinds of fruit are concerned, the Wagga district is practically shut out from the metropolitan market. That this is the case under present circumstances is fully borne out by the experience of many fruit-growers in that neighbourhood.

The disadvantages arise from two causes principally, viz., the inordinate length of time taken in transit, and the rough handling to which it is subjected by careless officials of the Railway Department.

At present the only means of transport at all available for large consignments is the goods train, and the time taken by such is in itself sufficient to cause great deterioration in quality.

But serious as is this disadvantage, it is of small moment compared with the careless and in many cases culpable action of those in whose charge the fruit is placed.

The fruit-growers of Wagga have frequently forwarded consignments of grapes to the Sydney markets, and in few instances have they reached their destination in a saleable condition.

My own experience has been of a character sufficient to deter me from making any further attempts to reach the Sydney market.

On one occasion my whole gross returns for a consignment of seventeen cases of grapes consisted of a remittance from my agent of the *munificent* sum of seven shillings in postage stamps.

This loss was occasioned directly by deterioration in transit, as I learned that at the same time grapes of a similar quality were being disposed of in the markets at from ten to twelve shillings per case.

All soft and easily damaged fruit requires the most careful handling; but more especially is it necessary with regard to grapes, which require to be treated as tenderly as a case of glass, marked "This side up with care." Cases of this fruit should not be turned over, but should be allowed to reach their destination in the same horizontal position in which they left the producer.

The most careful packing will be of no avail while the present careless practice is continued. To obviate the necessity of handling the fruit in transit a van should be specially provided for its conveyance, and such van should not be used during the fruit season for the carriage of any other class of goods. If the van could be attached to fast through trains so much the better. This boon was asked for by the fruit-growers of Wagga some time back but refused by the Commissioners for Railways as inexpedient.

Digitized by Google

It is very much to be hoped, as the Government are recognising the importance of the fruit-growing industry, and showing a laudable disposition to trace out, with a view to remedying, the evils with which those engaged in it are beset, that the subject of this paper will have due prominence in their deliberations.

Mr. J. D. LEECE, Secretary of the Southern New England Pastoral and Agricultural Association, Uralla, wrote on the 7th June, 1890, as follows:—

I may state there is much complaint about the exorbitant rates charged on small parcels of fruit sent by train.

Also about the careless way in which cases of fruit are knocked about in the train, and the difficully of getting a fair price for fruit—the fruiterer actually getting more profit for the mere selling, than the grower obtains for cultivation, gathering, carrying to train, boxes, and interest on outlay or rental. We have here a splendid district for cherries, plums, gooseberries, &c., but the cost of transit is almost prohibitory, and sometimes through repeated knocking about in the train, cherries and plums have reached their destination in pulp, the whole being a loss to the grower.

Why could not a car for fruit specially fitted up be attached to the daily mail-train in season for stone fruits. It would pay the Department, and would give an impetus to trade.

Experience in Export of Oranges to London.

E. H. ACRES, Baulkham Hills.

WITH regard to subject No. 7, "Improved methods of packing, transport, and market accommodation for fruit," I desire to say a few words, as I have had some experience in the export of oranges to London, during the years 1886 and 1887. In winter of 1886 I shipped 200 cases, per "Sorata." Had previous to that sent small lots by private hands; once by the sailing ship "Parramatta," nearly seventeen weeks on the voyage, and arrived quite sound. Those little experiments induced me to make some small shipments for sale, and I sent first the 200 cases above alluded to at the end of June, 1886. The company's agent allowed me to select a place for the fruit between decks, where there was good ventilation. The result was they arrived in London in good condition, and were sold at an average of 9s. per case of about 140 fruits. These oranges were pulled, not cut off trees, wrapped in tissue paper, and packed in ordinary packing cases, having spaces between the boards at the sides through which air could pass. Net proceeds fully 4s. per case, all expenses paid from the orchard, and I think if growers could always obtain as good a price, orange growing would pay well. My next shipment of 100 cases a little later was stowed in the hold of the ship, and proved a partial failure, because there was not sufficient ventilation. The following year I shipped nearly 2,000 cases in three shipments, cases used being much larger than packing cases, some twice as large. Those fruits were placed in the cool chambers: results not satisfactory, as all of the fruit arrived more or less damaged from two causes—the skins of the oranges were not dry enough when packed, and the cool chambers in the ship were too damp. Cool chambers will not do for oranges for a long voyage. The same year I sent small shipments of fifty cases each to Hamburg, Calcutta, and Bombay, to test the markets there, all of which were only partial successes, as the fruit did not arrive in good condition. Still, I feel quite sure that under proper conditions we can deliver vast quantities of oranges in London and elsewhere in Europe in sound condition, and fortunately for us the very time of the year that will best suit us to put our fruit on the London market, is the time when there is

Digitized by Google

least fruit there from other parts of the world to compete with ours. We should ship to arrive in London from end of August to end of October. To ensure success in shipping oranges the following conditions are necessary:—If there has been rain within three days before pulling, the skins will be too wet and must be dried somehow before being wrapped and packed. Fruits of one size only to be put in each case; all must be wrapped in tissue paper, and packed firmly, and so that air can get well through the cases. All fruit should be carefully examined before wrapping, and faulty ones discarded. The ordinary packing cases holding from 140 to 170 are the best to use, as too many fruit together will not keep sound. Number of fruit should be marked on end of case, and size as Nos. 1, 2, and so on. In the ship the cases should be packed where there will be a good circulation of air through and around them, and so kept dry. I have gone into these particulars because I consider the matter important, and worthy of the attention of orange-growers, who, in the near future must seek a market in Europe for their surplus fruit. And now that our Government have at last moved in the matter of fruit and vegetable production, there is every prospect of the industry being so fostered that it will shortly become one of the great industries of the Colony, and although orchardists of the present time think great quantities of fruit are grown now, I venture to say that before many years the quantity will be enormously increased by irrigation and otherwise in the outer districts of the Colony—not only of oranges but of all other kinds of fruit worth growing; and there is no doubt that this Colony with its various soils and temperatures is capable of producing in perfection every fruit worth growing, and I take it that that is a heritage worthy of our best attention.

With regard to the present fruit-market accommodation there is no doubt about its unfitness for the purpose, both as regards situation and accommodation, and looking forward to the great production of the near future it is evident that our market should be so situated that fruit trucks may be run into it, or shunted into it, and also have access to the harbour for export and import purposes. It is well known that the less fruit is knocked about the better, therefore the present system of putting fruit from truck to carts, thence to the market and there unloading to be again carted to railway or ship, must be very injurious and costly to the fruit-grower, and hence to the fruit-consumer, besides causing immense extra traffic along the streets. Of several sites suggested for a market two only are now spoken of—the one in George-street South, at Inglis' Sale-yards, nearly opposite the entrance to Redfern Railway Station, and a site at the bottom of Liverpool-street, with frontage to Darling Harbour. Why the latter site has found favour with any one in the fruit trade—to say nothing of fruit-growers—I cannot understand. It is in an out of the way corner of the city, an ill-smelling place, and away from all street traffic, while the Inglis site is just what is required, and has always been advocated by the Fruit-growers' Union, with railway going past it on its way to Government wharfs at Darling Harbour, where fruit can be left for shipping, and imported fruit brought up to the market. Truck loads of fruit can be run right in from country districts, and there can be some handsome fruit-shops fronting the street along which the great traffic of the city passes, and most convenient for purchasers going to the station by 'bus. Altogether no site yet named is anything like as suitable as the Inglis site is. As to the market itself, two floors will be necessary. On the lower one there should be a couple of large sale-rooms where cases of fruit could be shown previous to sale by auction, and the upper floor for storing and packing fruit.

Digitized by Google

The Gathering and Packing of Fruit.

T. LAWLESS, Sydney.

In submitting these few remarks on the gathering and packing of fruit it may not be out of place to point out to growers that the neglect on their part of due precaution in collecting and packing their crops is frequently the cause of low prices having to be accepted in our own market, as well as leading to loss and disappointment in consigning to the adjoining colonies.

We have many natural advantages for the raising of fruit, and can more than hold our own in the markets of the colonies, provided that we do justice to our opportunities. We are especially favoured, as a great deal of our fruit-crop—notably stone-fruit—is fit to gather long before the same kind in the other colonies can be sent to market. Thus we can send our surplus to our neighbours at a time when they are unable to supply themselves, which must prove to be a mutual advantage. As an example, I may mention that during the last season splendid black Hambro grapes have been sold in the local market at from one penny to twopence per pound, when the same grapes would readily have brought threepence to fourpence per pound in either Melbourne or Brisbane. Our grapes, from their superior quality, will always command a sale in intercolonial markets. In this short paper I desire to point out, in an unpretending way, the difficulty experienced by those who have to deal with the fruit after it has left the grower's hands, and to make a few common sense suggestions on the picking and packing of fruit, as the result of an experience of over thirty years.

The most important crop we produce, both for quality and for the time it is in season, is the orange, with which may be coupled the lemon. In order to give this fruit a fair chance it should not be plucked until the sun has thoroughly dried its skin. If this be not observed, and the fruit be plucked while the skin is damp from dew or rain, in a few hours after being picked dark marks will appear on the surface, and this will quickly be followed by decay, the appearance of the fruit being so much against it that in any case a low price is the result of this mistake. Great care should also be taken in pulling the fruit, so as not to damage the eye, as if damaged decay sets in at once; the stem should be cut, or a skilful twist of the hand will break the stem. The oranges should not be allowed to fall on the ground or grass, and so collect dirt. The fruit should be placed on large trays, and packed from these. If this be done no dirt will adhere to the surface of the fruit, which, if allowed to remain, will bruise the skins when packed tight, and cause decay.

The state of the surface of the fruit has an important effect on its "keeping qualities," as well as on its appearance, and should be carefully noted. No doubt some growers are aware of this, but it is nevertheless a fact, that can be vouched for by those who have to deal with the fruit, that either through a want of knowledge or carelessness a large portion of growers do not observe these precautions. Oranges and lemons should be handled very carefully in packing for long distance. The practice of gathering with rakes cannot be too strongly condemned, as the practice is fatal to the preservation of the fruit for export.

The fruit should be carefully sorted, and the various sizes separately packed. This will cause the fruit to show to better advantage when opened. When fruit is intended for a long journey a medium size orange should be selected, as a large orange is not a "keeping" sort, and the smaller sizes will not command a price.

Digitized by Google

This rule applies to lemons. Mandarins decay too quickly to be sent any distance, and the adjoining Colonies are the only market we can hope to secure for these kinds.

In placing all varieties in cases they should be "hand-rowed"—that is, each layer of fruit should be separately adjusted before another layer is commenced above it. The grower should see that the fruit is thoroughly dry, and is lightly packed in order that none of it should be displaced, and as a consequence injured.

When the fruit is loose it will be found, when opened, to be discoloured and bruised, and in an advanced state of decay.

The cases should be properly dried before packing, as wet cases discolour the fruit as well as cause it to rot.

Nothing should be allowed to remain in the cases except paper. The practice of some growers of placing grass on the tops and in the bottoms of cases should be discouraged, as it spoils the colour and injures the skins. When fruit is intended for a long journey it will greatly assist in its preservation if wrapped in tissue paper—each orange or lemon to be separately treated. The fruit should be properly packed in the orchard, with the view of avoiding the expense as well as the damage to the fruit caused by the necessity of repacking the fruit when received in the city by the shippers. There are few growers who observe the above necessary precautions in packing their fruit. It is self-evident that a more satifactory result could be obtained if the growers generally would send down their fruit in a condition to ship without the repacking referred to being necessary. An important matter in connection with packing is the size and shape of the cases used. The case generally adopted by growers is admitted to have important defects, but the trade has been very conservative in this respect for many years past. My experience proves to me that the cases should be of a uniform size, and should be sold with the fruit, as the practice of repacking, as before stated, is an unnecessary labour, and reduces the value of the fruit; and in no instance should fruit be packed that will not stand a journey when intended for export. The most convenient size of case is 12 inches wide, 11 inches in depth, 22 inches in length.

This case will be found to be light, and easily handled, and the fruit packed in this form of case looks well and fits well.

Experience is demanded in the plucking and packing of fruit, and great loss is sustained by the growers by the employment of novices in the important and delicate work of gathering the crops.

Under existing conditions stone fruit is with one exception confined to the local market. Queensland is the only colony to which we can consign. Our season is earlier than in the adjoining colonies, and after supplying our own market we could send almost unlimited quantities of stone-fruit to our neighbours, who would be very happy to receive it in the absence of having any of their own.

Apples and pears have not yet proved a safe crop for export.

In every case in which I have tried a foreign market with our local apples I have experienced loss. One can never depend on their keeping, and until this quality is established the fruit is not available for export. One cause of this is the careless manner in which the fruit is picked and packed; and in fact the preparation is sometimes so careless that decay often sets in before it can be placed on the local market. The growers should exercise greater care in this respect, and better results would be obtained. The cases I have described will be found to be admirably suited for the packing of apples, pears, and stone-fruit, with the exception of plums. Cases best suited for

Digitized by Google

the packing of plums should be half the size of those referred to, as plums will not sustain much weight without injury, having a very tender skin, but at the same time must be packed close, to prevent any displacement. Grapes also may with advantage be packed in cases of the same size, for the same reasons, and similar care should be taken to prevent the possibility of shifting when packed.

In regard to the kinds of fruit it is advisable to cultivate it may be confidently suggested that we can do with every kind, provided it can be obtained in a condition favourable for shipping.

We have a monoply of some kinds of fruit, and when the grower takes full advantage of his opportunities he can grow many sorts that will compete in the intercolonial markets with their own local fruit in consequence of its superior quality.

The grower should remember that his interest in his produce does not cease when he receives his cheque from the buyer, be that buyer a shipper or local trader. The success and permanence of his occupation depends on the quality of the fruit, and the condition in which he sends it to market.

If the grower does not co-operate with the shipper by seeing to the condition of his fruit, in opening up new markets and at the same time retaining those we have already secured, the shipper will lose heart, and the surplus fruit will have to be sacrificed at a nominal price.

Fruit-growing is on the increase, and it is more apparent every year that the development of the trade is towards export.

Many of the growers do not fully appreciate this important feature of the trade, and are inclined to regard the shipper as a natural enemy. This, it is evident, is due to imperfect knowledge of the only means of disposing of more than half of the fruit they produce; and the prejudice against the shipping trade, and the obstacles attempted to be thrown in its way by a section of the growers, is due to a want of foresight. In their own interest they must be made to realise that the only conditions on which the trade can profitably exist depend on the steady success of the export trade, as without this means of disposing of the enormous surplus more than half the growers' occupation would be gone.

This is an indisputable and obvious fact, and it would not be in the least degree altered if the growers dealt with their own produce.

The shipping trade is the only possible development, and until the growers and our city fathers recognise this truth, and co-operate with the shippers in consolidating the trade in place of the suicidal policy of dividing it, there will be the danger of losing a large portion by a more enlightened policy prevailing amongst our neighbours and rivals. Let the grower concede a little to the shipper, and put him on a similar footing to other trades in the matter of terms, and by judicious co-operation the future of the fruit trade will be assured.

The best way to pack, transport, and make suitable market accommodation for Fruit.

W. STIMSON, Fairfield.

First. The method of packing.—This I do not profess to know as much about as the growers or Sydney packers, who have constantly attended the markets; but I think in the first place we should have a uniform size of case as all the other colonies have, that is, a bushel case of the same cheap kind, to be sold with the fruit wholesale by auction or private sale, and thus be

Digitized by Google

packed ready for export without repacking. By this method the grower would save at least 20 per cent. of the loss of the gin-cases he now uses; as many of them are never returned. The next benefit to the grower would be a 20 per cent. saving in fruit, as twenty of our large cases fill about twenty-five of the cheap cases which are imported or exported, and when people buy a case of fruit nine-tenths of them pay the same price for the smaller case as for the other. This, I think, is a sound reason why there should be no difference in weights and measures the world over, if possible; it would act like a universal gauge of railways. These changes would hurt no one, but help all, as it saves us all from loss of time, labour, and money. This fruit for export should be gathered and packed carefully of equal size, and not too ripe or too green, so that they would unpack like the fruit from San Francisco and Tasmania.

Second. With reference to our home market we want to send our choice ripe fruit, packed in nice handy neat cases to suit private persons and shops in city and suburbs, in bushel, half-bushel, and quarter-bushel cases. The three cases could return to grower as one, for the two smaller ones would fit into the large one as a nest of three. The smallest could be used to pack the choice ripe fruits—such as strawberries, cherries, plums, and other soft varieties. By placing sheets of paper between the layers of fruit, damage by bruising would be prevented, and it would arrive in the market in a sound and attractive condition. To do this the grower would have to be better paid than at present, and this could be brought about if there was a market where private individuals could purchase a case of fruit and take it straight home before it undergoes the handling by middlemen, which causes injury to the fruit and a loss to both grower and consumer. This kind of case should have the grower's brand on it, which should be registered under a "Brands Act" such as the English one, and all cases should be returned or paid for as in the London markets. Most of our growers state that they always obtain better prices and a more ensured sale when they put their own brands on the cases, because if the grower takes the trouble to pack only good fruit he gets the credit for it, while if he is careless the consumers know to avoid that brand. It is also a protection for the grower, as anyone using his cases and brand is liable to a criminal prosecution for injury to the owner in his trade, and committing a fraud against the purchasing public,—the same as with spirit, wine, or cordial manufacturers, and others who have their brand on their bottles, packages, or casks. The best way to pack fruit to send to market is to sort into 1, 2, 3 class qualities, in cases marked so that the seller may offer to the buyer each class honestly and at fair value. By this method the grower would get better prices for first quality fruit, and it would enable the grower to send the smaller or wind-fall fruit to market at a paying price to him; while under present marketing conditions others get all the proceeds as commission and the grower has his labour for nothing; so the fruit is left to waste, while if we had the market convenience to meet the working classes with this sound wholesome fruit it would be a great saving to the country at large, and to the grower and consumer in particular.

Third. Transport or carriage to market.—As nearly all our Colonial grown fruit comes by railway now, and as our North and South Coast railways are extending, very shortly nine-tenths of it will come by rail which is the quickest and best means of transit, if proper care is taken in starting, stopping and shunting trains to prevent sudden shocks or concussion. Through careless shunting much soft summer fruit and grapes have been very much damaged in the past. The season before last I had grapes injured at different times. On one occasion they were jammed from one end of the case to the other,

Digitized by Google

and the boxes appeared about two-thirds full, so that grapes that would at that time have sold for 3d. per lb. wholesale were sold at 1d. This was done in a journey of but 18 miles. Not only is softer fruit reduced to jelly, but the juice running over sound fruit also destroys the sale of the other cases. In compliance with the requests made by the Fruit-growers' Union, the Railway Commissioners are providing more suitable trucks, and have ordered that more care shall be taken in shunting.

They have done everything they can to supply our wants in that direction; they had fifty of this kind of vans made at once for last season's fruit, and now fifty more are in course of construction for the same purpose, which we think will give every satisfaction to all concerned; but we hope, as something is still wanting to make the carriage of fruit and other perishable and breakable goods a grand success, that within the next six months the Commissioners will see their way clear, when the duplications are completed, and the lines generally in better order, to run special trains daily at suitable times for market, with fruit; all vans in said trains to be furnished with best buffers, and the best men put in charge and made responsible for any damage done, if proved through their neglect. If the Commissioners can thus bring our fruit into the market without injury in the transit, they will deserve the respect and gratitude of the public in general, for it will be health to the consumer and wealth to the producer and so benefit the Colony at large.

4. *The market accommodation* comes last on my paper, but is not least, but the most important question of them all, because, although we now have a Department of Agriculture, and a Minister at the head of it who, I believe, wants to do all he can to increase the production, and to benefit the producer and consumer, I say if we plant our orchards and vineyards in the best possible manner with the best trees and vines in the world, and attend to them in the best possible way, get rid of all the insect and other pests with the help the Agricultural Department can give, produce the best possible fruit, and have it conveyed to Sydney by rail in good condition—when all this is done we will require a market where we can display it to the best advantage. The present markets are totally unfitted for the present trade; and it would be possible to procure a site for markets in a cleaner and more wholesome locality.

Another thing too, the grower should have a better opportunity to deal direct with the consumer. In this way the consumer would be able to procure fruit at a cheaper rate, while there would be more profit left for the grower, as the fruit would not have to pass through so many hands.

But with reference to proper market buildings worthy of the city of Sydney, and the large surrounding suburbs, containing such a large number of inhabitants, who consume large quantities of fruit daily, and who would be much more healthy, and consequently more happy and useful if they used three times the quantity of fruit they do at the present time. The present growers are willing and able to supply this if they have market accommodation, roomy, clean, and wholesome, fitted with all necessary conveniences for all concerned. To accomplish this object there must be a dry, healthy, and central position, with railway communication from all parts of the Colony into it and out of it, and to and from the shipping, with plenty of street-room all round, clear as possible of other traffic; and trams and coaches to convey the public to and from it in all directions. It should be not only a city market but a national one, large and central enough for all the fruit trade, wholesale and retail; and I would suggest vegetables wholesale and retail, also for nurserymen and seedsmen. Then vegetables, as requirements increase, could be grown a greater distance from Sydney, and still brought

Digitized by Google

by rail straight into this market. Thus a large market could be carried on in one place, and all these branches of the trade would be benefited by having this large central market, with easy and cheap access to and from it, and where everything required by the consumer or wholesale or retail buyers could be got in one place. Then, having their wants supplied, they get home at once instead of losing time and blocking the streets, as at present, having to run over half the town to a dozen places to get supplies which they should get in one place. Such a market, where all these attractive requirements could be so conveniently got together, would be a benefit to sellers and buyers if they could be collected in this grand place, because all who wanted to buy any of these necessities and luxuries would go to this place, where they could select whatever they required from those who sold fruit, vegetables, trees, shrubs, plants, and flower-seeds ofevery description. At present many retailers of these things have to rent shops at heavy rents, which have to be paid by the grower and consumer; if part of that rent could be saved by the shopkeeper he could pay a little more to the producer, and live more healthy and happy in a nice cottage in the suburbs, and still have a better profit himself, because in this large market he could have a nice large place to sell his goods at perhaps one-fourth the rent or less. Now comes the all-important question: where is the site for the grand market to be found, which will combine all these grand qualities, in this thickly populated city, for nothing less than 5 or 6 acres is worthy of consideration, or of permanent use for a great national or municipal undertaking of this kind.

I venture to say, that the only site fit for such a market (with all the advantages above stated) that can be found is in George-street west, opposite the Redfern Railway Station, taking in all the frontage to George-street from Railway Bridge to "Wheat Sheaf Hotel" inclusive. One advantage is that the street at the back is about 16 or 18 feet lower than George-street in front of this block, and this lower portion is on a level with the Darling Harbour line, which now runs on to this land to deliver cattle for sale in what is known as Inglis and Ellis' sale yards. This land may be cut down, square up to George-street, to the lower level with the railway running all through it from and to all parts of the Colony, to and from the shipping at Darling Harbour, and when a railway is constructed for goods traffic all along the wharfs it will be continued to Miller's Point, thence to Circular Quay, and all round to the shipping there, thus enabling us to ship fruit and vegetables or receive consignments of same, not only as at present time at Darling Harbour, but with this new railway, to load and unload anything in the trade, both inland and foreign, to these new markets. All vegetables or fruit sent to be sold wholesale could be sold on the railway level-floor, either by the grower, agent, or auctioneer. There must be lifts to convey from this floor all produce for the retail-stands or stalls on the next floor, on a level with George-street, with three or four grand entrances from that street and wide promenades running between the rows of stalls, with plenty of room to enable buyers to view and select their purchases. Another floor or two if necessary could be built on top of this, with full provision for light on lower floors, and here abundant room could be provided for high and dry storage of fruit, sorting and packing, case-making, offices of different kinds for agents, auctioneers, &c. All along the front of the building between the entrance to the markets, can be erected grand shops, which could be let by the Corporation at good rents. This would help much to pay the interest on the outlay and pay part of the principal, most of which, however, should be left for coming generations to

Digitized by Google

pay, as they would get the chief benefit in the use of this market; and also get the benefit of the enormous increase of value in this property as the years roll on. Therefore those who use markets should be charged as moderately as possible for the legitimate use of them, and I trust the Government will resume the site for markets for the purpose above named, and that the mayor and aldermen of the city, with the help of Parliament, will work together to accomplish the great national undertaking; for I feel certain if it is carefully and wisely carried out, it will, in a short time, prove to be one of the most useful and profitable undertakings in the Colony.

If the Parliament of this country and the Corporation of the city of Sydney would work together to carry out this grand work, they would earn and receive the esteem and gratitude of this and succeeding generations by conferring a lasting benefit on this country. Requests for markets on this site have been made many times during the last two years by the "Fruit-growers' Union," by deputations to the mayor; also to the Government on several occasions, backed up by a petition signed by over nine hundred growers in Cumberland, also by the approval of about thirty members of Parliament and representatives from all parts of the Colony at the "Fruit-growers' Conference" of New South Wales, held in the Town Hall, Sydney, last year. Now, we believe, as we have the Department of Agriculture to assist us in this, our greatest need, that if you, as its first Minister, can help us to make this an accomplished fact, it will be one of the greatest blessings that can be conferred upon the growers and consumers of this Colony.

Present unsatisfactory System of Marketing Fruit in Gin Cases.

J. ROUGHLEY, Dural.

In taking up this subject I have done so from being thoroughly impressed with its great importance. If there is one thing more than another connected with the fruit industry that needs to be considered with a view to bringing about a reform, it is the present unsatisfactory system of marketing our fruit in a case commonly known as the gin-case. This method of sending fruit to market was adopted many years ago when fruit-growing was but in its embryo state. At that time perhaps there could not have been chosen a style of case more adapted for the purposes, inasmuch as but a small quantity of fruit was being grown, and therefore the fruit industry in general being on a small scale it was but a comparatively easy matter to have all the cases emptied of their contents immediately on a sale being effected, and the growers could take their cases home with them to serve them on other occasions. This being so, doubtless at that particular stage of the fruit-growing industry the gin-case was the cheapest style of case that could have been adopted; for it is noted for its durability as it, with careful handling, will last for several years. But although wisdom may with propriety be ascribed to our fathers and predecessors in general in the fruit industry for their choice of the gin-case in which to convey their fruit to market, in my opinion it certainly cannot with equal propriety be applied to us for retaining it; for although it may at one period have been the most suitable and cheapest style of case, it is at the present period the most unsuitable and the most expensive. I do not wish to leave the inference to be drawn from the foregoing assertion that I am under the false impression that the actual cost of the gin-cases at present is greater than when they were first adopted, for I am fully aware that the actual cost was greater then than it is now. There is an old truism remarkable in its truth, and

Digitized by Google

forcible in its present application that, literal though it may be, circumstances alter cases; and most certainly present circumstances, as relate to the fruit industry, so alter the gin-cases as to make them the most expensive kind of case that could possibly be used for the purpose of marketing fruit. Circumstances have wonderfully changed since the time when fruit-growing was first started. As I stated, when fruit-growing was but in its infancy, it was quite practicable and convenient for purchasers of fruit to immediately empty the cases being as it was so sparsely grown; but since the industry has expanded and developed to the enormous extent it has, it has become not only inconvenient but a moral impossibility to have all the cases emptied in the market. I need not here attempt to particularise the many obstacles which render it an impossibility, as I would only be taking up the time of this Conference unnecessarily, and exhausting your patience. But apart from anything else the largeness of the trade is sufficent in itself to render it impossible. As it is impossible to have all the cases emptied in the markets it simply becomes the inevitable that buyers must be allowed to take away the cases; always of course with the understanding that they are to return them. But the rule is, concerning the majority of buyers—"Out of sight, out of mind." And as we have no check upon them in the form of being able to ascertain who has returned the cases and who has not, there being a by-law in vogue to the effect that no empty cases are allowed to be brought into the markets, the result is that a very large percentage of the cases are never returned. As the cost of these cases is two shillings each, to lose a very large percentage of them is to make the marketing of fruit far more expensive than it should be. Taking the present state of the market when fruit is selling at merely a nominal value the effect of losing cases so expensive, to such an enormous extent, is wholly disastrous to the grower. Another strong objection to the gin-case (or rather it seems to me to be such) is that it is far too large, as it holds a bushel and a quarter, while I know of no cases used by the growers of other colonies that are capable of holding more than a bushel. The evil in this is that the price realised for a bushel and a quarter of fruit is no greater than would be realised for a bushel. I have arrived at this conclusion from observation. I find that fruit of the same quality as ours sent in bushel cases from other colonies realises quite as much as local fruit in cases containing a quarter of a bushel more. If the growers of New South Wales are so liberal in disposition that they are willing to give the buyers a quarter of a bushel for every bushel they purchase, they must surely be commended for their liberality; but I think it would be better for them to display their beneficence in a manner that would be recognised and appreciated, for their present method of bestowing their munificent gifts only calls forth ridicule, even from the recipients of their bounties, and in many instances they return thanks in a practical though ungrateful manner, by keeping their cases. There is also another evil which I might mention. Under the present system, although the growers lose a large percentage of their cases, they are always expecting to get them back. In many instances they travel many miles to the various railway stations and wharfs, expecting to get a sufficient number of cases to make up a load, and perhaps find to their dismay but a solitary one or two. It has happened in such instances that they have not been able to obtain cases at the case factories, and in consequence they have had a quantity of fruit perish that should have been sent to market, and yielded them a fair return. Although the fruit-growers are by far the greatest sufferers through the present practice of using the gin-case for fruit purposes, yet it is not without evil effects as relate to fruit

Digitized by Google

merchants and dealers. In one particular which I have mentioned as being an evil to the grower, they are a decided advantage to the buyer, that is the quantity of fruit contained in the case. There are, however, disadvantages especially to the merchants or exporters that altogether counter-balance any advantages. While the merchants in many instances, much to the annoyance of the growers, send fruit away to various ports of the Colony just as it comes from the growers already packed in gin-cases, yet, in exporting, it is necessary for them to repack the fruit into other cases of a different description and smaller size. The disadvantages of this must be obvious to all. In the first place there is the unnecessary handling of the fruit. The less fruit is handled the better, for every time it is handled some is bruised; and if fruit is bruised it cannot be expected that it will carry. And often the repacking has to be done hurriedly and under disadvantageous circumstances, and if done in such a manner and under such circumstances it is altogether improbable that it will arrive at its destination in good condition. There is also the unnecessary handling of the fruit in extra carting (1st) from the railway and steamers to the market; (2nd) from the market to the respective stores; and (3rd) from the stores to the steamers.

In the second place there is the unnecessary expense, as extra hands have to be kept in constant employ for the express purpose of repacking, &c., which means paying away a considerable amount of money weekly for this purpose alone. This reminds me of another evil effect which it has upon the growers, and which I have omitted, that is, increased expense attached to exportation. The greater the expense attached to exportation the less is exported, and the curtailing of exports means a considerable loss to the producer, as fruit is thrust upon the local market which would have otherwise been sent abroad. This system is not altogether without evil as relates to the general dealers. While there are many of them who regard not the right and properties of others, there are those amongst them who are scrupulous and honorable, who, having obtained the loan of cases, feel under obligation and duty bound to bring them back; and although the inconvenience of doing so is comparatively trifling, still it would be better for them if the necessity for so doing did not exist.

In the foregoing I have just given an epitome of the evils attached to the present method of marketing fruit in gin-cases as relate to all sections of the trade. As I indulge in taking a retrospective view of the fruit industry as far as that view presents itself to me, and in so doing behold its rapid growth and unparalleled successes, and as I trace the vast improvements effected through its various stages in every branch of the trade and almost in every particular, I am filled with amazement. But as I find the conditions of things regarding the kind of case used for marketing fruit have remained the same through all its stages, I cannot in dwelling upon the fact but experience amazement of a different nature that it should be so. The question naturally follows:—"Why has it remained so?" The true answer to this query can only be given in the form of a mild censure upon the fruit-growers. Although almost in every particular they have acted with indomitable courage and indefatigable zeal, yet in this particular they have been fearful and timid to venture upon any change. It cannot be said that the evils have not been observed by the growers, for they have not only observed them but have experienced them in the form of having to draw to an unreasonable and unwarrantable extent upon their banking accounts, to purchase new cases from time to time. Neither have the evils been unobserved by the fruit merchants and dealers, for they have frequently expressed dissatisfaction at the existing state of things connected with the fruit cases, and have been

Digitized by Google

perplexed to know why the growers have not sought to bring about an alteration, as the remedy is quite within the growers' power. It is indeed a matter to be wondered at that the growers do not seek to adopt some remedial scheme. They are continually bewailing their losses, and are continually denouncing all but themselves in connection with the fruit-trade, while they have themselves alone to blame. In view of an alteration the question arises:—In what way can an alteration be effected that will be beneficial to those chiefly concerned? Some growers who have been endeavouring to think out the problem have argued for the retention of the gin-cases, and making it a rule of the markets that a deposit of 1s. be left upon each case intended to be taken out of the market by the purchaser. As far as I can see even as affects the growers this would not ameliorate the evils in the least degree, or at least to a degree desirable. All those leaving a deposit on cases would look upon them as being their own, with the option of bringing them back and having a refund of the deposit or selling them anywhere they may choose. And how easy it would be for those purchasing fruit to send away, just to charge on the shilling for the case instead of going to the trouble of buying another case and repacking. And as the gin-case is handy and convenient for many purposes, and worth 2s., it is altogether improbable that it would be returned. Even if 2s. were left as a deposit the proposal is altogether impracticable, as any person who has had experience in fruit-selling must know; in fact it would only increase the difficulties and multiply the inconveniences for both buyers and sellers. My own idea is that in order to simplify the matter and do justice to those concerned, a cheap case should be used of a uniform size, capable of holding neither more nor less than a bushel; this to be the case used for general purposes. And for special or particular purposes there should be used cases capable of holding half a bushel and a quarter of a bushel respectively, neither more nor less—fruit and cases to go together. Further, to enforce the general adoption of this kind of case, pressure should be brought to bear upon our legislators with a view to have an Act of Parliament passed empowering the Council to pass a by-law making the use of such cases compulsory. If this plan were adopted I am sure it would be a direct gain to the growers and merchants alike, and would be found to be convenient to the dealers and shopkeepers. This is by no means a new idea, but on the contrary has been adopted by all the colonies with the exception of New South Wales, and having been tried appears to give the greatest of satisfaction. I am firm in my opinion, that if adopted by us, it will meet all the requirements of grower and seller. As it is, nothing could be more unsatisfactory. Pecuniary loss brought about through trading always engenders contention and strife where it is traceable to misplaced confidence, and so through the buyers' failing to return the growers' cases causing considerable loss the latter are exasperated; and instead of there being harmony and unity in the trade there is discord and contention.

Market Accommodation.

T. JESSEP, Sydney.

The subject of market accommodation is one of considerable importance to the fruit industry of this colony. The vexed question of the selection of a suitable site for this purpose has occupied the attention of the different sections of the trade, as well as the members of the corporation of Sydney for some time past. In order to arrive at a satisfactory conclusion the requirements of the several branches of the industry should be considered,

Digitized by Google

and in so far as is possible, a locality selected for a central Fruit Market that would meet the convenience of the largest number, and at the same time be conducive to the further development of this important local and intercolonial industry.

As a means of arriving at a just estimate of this matter it may be advisable to consider the sources of our fruit supply; and the direction in which the native grown fruit is likely to find its best market.

For about five months in the year, viz., from the months of November to March our market is supplied principally with local grown fruit of nearly every kind, and that period may be appropriately described as our fruit harvest. From the last-named month to November our local fruit supply is almost exclusively confined to oranges and lemons. The fruit is brought to the market in the metropolis by two methods of conveyance, the railway being utilised for the product of orchards adjacent to the main trunk lines and their branches, while a large quantity known as water-borne fruit is grown at such places as Lane Cove, Hawkesbury, Gosford, and other well known districts. It will be seen that in order to meet the convenience of the growers in the aforesaid places the fruit market should be situated in such a position as to possess the two essential conditions of railway connection and water frontage to the deep waters of Port Jackson.

It is obvious that the keeping qualities of fruit are materially affected by unnecessary handling, and unless these conditions are supplied the fruit will be subjected to the expensive and damaging necessity of cartage from the Railway Depôt, and from the wharfs where it may be convenient to the river growers to land their produce. There is likewise to be borne in mind the loss of time and additional handling entailed in this disadvantage, as well as the increased cost of the fruit when it reaches the market, with the further labour of having to convey back the empty cases to either the train or steam-boat.

The second source of supply is from intercolonial importation. This branch of the trade has attained immense development, as over 560,000 cases of fruit are received into Sydney every year, as well as about half a million bunches of bananas, together with smaller consignments of other tropical fruits, nuts, cocoanuts, pines, grapes, &c. As this fruit for the most part arrives during the time that our local productions are almost solely confined to oranges and lemons, it does not appreciably affect the local growers, but has the advantage of keeping the trade supplied all the year round, as well as contributing largely to the sale of our local fruits.

The varying climates of the Colonies of Australasia produce a rotation of the fruit crops, so that there is a reciprocal advantage derived, and the produce of an adjoining colony is received by its neighbour at a time when its own fruit is maturing, that colony in turn receiving the surplus of its former benefactor.

This colony has established herself as the entrepot of the fruit trade, both for export and import, and is likely to largely increase the trade in the future.

Our own fruit during its season comes into the market very rapidly to an enormously greater extent than even the strong local demand can absorb; and as it need hardly be pointed out it is one of the most perishable articles of commerce, a rapid means of dealing with it in the direction of export is imperatively necessary. It is a somewhat surprising circumstance in connection with our local production of fruit that notwithstanding the enormous quantities consumed locally, a still larger quantity is exported to the adjoining Colonies, and at times to America and Europe. Thus, it is obvious that

Digitized by Google

in the interest of the growers as well as the merchants, the promotion of shipping facilities is of the very first importance in connection with a fruit market.

The growers in the past appear to have overlooked the great effect on the price of their productions which would result from the curtailment of the export trade, and in order to maintain and develop this trade in the future, it is essential that judicious means should be adopted—in the first place, to avail ourselves of the natural advantages we possess in our extensive wharfage; and in the next, to realise the fact that by well considered selection of a market site, we may reduce the price of the fruit by the absence of cartage and handling, without in any way diminishing the well deserved profits of the grower. It may be laid down as a principle that there is no utility in labour and expense that can be by intelligent foresight avoided or rendered unnecessary. It will readily be conceded that the present method of dealing with our fruit supply renders it inevitable that a vast amount of time and labour are wasted in the useless cartage and handling rendered unavoidable through the market being inconveniently situated for both railway and water-borne produce, inasmuch as the expense of cartage, and as pointed out, the loss of time and damage, to fruit seriously hamper both the local import and export branches of the trade. The reduction of the first cost of fruit, by dispensing with all unnecessary labour in connection with its delivery to the market, would place the produce in a better position in competition in foreign markets, as well as through the reduction of first cost, lead to a larger consumption locally, not to speak of the percentage of saving through the decrease of waste by the fruit coming into the market in better condition. This would be accomplished without diminishing the profit of the grower. There is also the importance of the trade in imported fruit to be taken into account. If the expense of cartage and loss of time is considered, under the present conditions it will be realised what a very large sum of money every year is wasted. In the event of a market site being selected with a water-frontage, this large amount would be saved, and the fruit could be disposed of locally at a cheaper rate, as well as in improved conditions. The folly of the present method is apparent in the treatment of bananas. The cartage and handling that this fruit receives leads to the deterioration of a large percentage in transit alone.

It has been urged by those who have failed to appreciate the advantages of a water frontage that ships would not discharge at the market wharf, and that it would not be used in the discharge of imported fruit. This statement appears to be made through insufficient knowledge of the relations existing between the merchants and the shipping firms. If we take the Tasmanian trade as an example, it will be found that 40,000 cases per month are imported during many months in the year. Is it reasonable to suppose that merchants would submit to the loss of time, trouble, and expense—not to mention the damage to the fruit—of having to cart this enormous quantity of produce, when by the steamer coming up to the market wharf the whole of it could be saved, with comparatively trifling expense to the shipping company? In these days of competition if one boat would not do it another would, and the shipping firms would have to meet the requirements of their customers in such a reasonable demand. In Hobart, for instance, the shippers have made it a condition that the large steamships which take their apples and pears to Europe, shall come alongside the wharf to receive this freight, in place of lying out in the stream, and having the fruit put on board by lighter, as was formerly the case. Then there is a class of growers that is increasing in numbers, called the "river growers."

Digitized by Google

The rivers and estuaries around our coast are peculiarly adapted to the growing of certain classes of fruit, and the shelter afforded in these localities causes them to be sought after by the fruit-growers as a reliable neighbourhood for fruit-growing. These people send their produce to the metropolis by small river steamers; and their interests for proper market accommodation should not be lost sight of.

There is another important section of the trade whose interests and convenience should receive due attention in the settlement of this important matter. The fruiterers and dealers, equally with the merchants, should be considered as constituting the local customers of both the growers and the merchants. The importance of the condition of the fruit when sold is to them a serious matter. The growers' interest in the product ceases when he effects a sale, and between the sale and the storing the fruit not more than twenty-four hours perhaps has elapsed. But the fruiterers on the other hand may have to keep the purchase for a week longer before he can dispose of his purchase, therefore the soundness of the fruit when it comes into his hands is of the first importance. The waste through decay must in many cases be a serious tax on possible profits, and decay is greatly accelerated by rough usage of any kind—cartage and handling being the most damaging. Thus, a market, which from its situation will reduce the damage from this source to the minimum quantity, will most effectually conserve the interest of the fruiterers and the dealer; and this result can only be secured by selecting a site where both locally-grown fruit, as well as the imported, can be delivered into the market direct from the railway or the vessel which conveys it from our coastal rivers, or from the neighbouring colonies, when our own fruit season has ended.

There is also the important matter of the locality in which the market is situated. This should be as near to the recognised centre of the town as the large area required by the market will admit. It will be noted that in cities people make for a common centre to do their business and effect their purchases, and the nearer a market is to that common centre the larger will be the chance of customers enjoyed by the sellers of goods. Thus it follows that the advantage of the vendors and the convenience of the purchasers is secured by choosing a locality in such a position as to enable the purchaser of fruit, whether he comes from the city or suburbs, to make his purchases, and transact his business with the greatest economy of time.

The interest of the general public is likewise served in the diminished price of fruit, due to the causes indicated, viz., the reduction of the market price through the absence of cartage, handling, and consequent waste by damage; and further, in the convenience—should they wish to purchase in the market—of having it in such a position that it could be reached in a few minutes from the recognised centre of the town.

To the contention that has been advanced that the common centre is at Redfern Station, I reply that the business centre is concentrated in the vicinity of the shipping, and will continue to be so. The real business of the city is confined to a comparatively small circle, and to get as near this circle as it is possible should be the object of those selecting a site for a wholesale fruit market. This is so obvious to any one who will calmly consider the matter that I cannot understand any section of the fruit trade ignoring this plain necessity, and wishing to throw away this most important and indispensable requirement of the metropolitan fruit market. Whatever uses the market may serve in the direction of retail trade, it should be borne in mind that the main object in view should be the establishment of a wholesale market, worthy of the present important trade, as well as the certain

Digitized by Google

extensive development of that trade in the future in the direction of export. Science is rapidly making it a certainty that fruit may be sent to any portion of the world with small risk of failure, and the country receiving it will always regard it as an acceptable consignment, inasmuch as it supplies a want that either the climate or the season prevents the country from providing for itself.

The question at issue.

The existing markets stand *self-condemned*. They are a libel on the fruit trade, and an eye-sore to the *city*. It is the reproach of visitors that we beautify our city with costly buildings, erect a colossal pile of most elaborate buildings for a Town Hall, and yet allow the most dilapidated row of sheds to be found in Australia to disfigure the heart of the city, and dignify them with the name of a *fruit market*. Apart from their repulsive exterior, they have not even the merit of serving the purpose for which they were formerly erected—some forty years ago—of supplying accommodation for fruit selling, even to a moderate extent. The City Council has from time to time made some show of a desire to deal with the matter, and I understand some time ago made a recommendation to the Government for the resumption of two acres of land near the Redfern Station known as Inglis' Cattle Sale Yards. The position of this site would at once condemn it. It has a frontage to the railway, which was the chief advantage claimed for it, but even this is discounted by the necessity of all goods having to be taken to the Darling Harbour Depôt in order to disengage trucks with special consignments such as fruit, to permit of these trucks being collected together, and retrained to the market. Apart from this, only a fraction of the trade could use this proposed market, if here built. The river grower would not cart his fruit from the shipping to the market; he would prefer to consign direct to the *merchant* as other *consignees*, or establish a market in conjunction with the merchants and others in a more central and suitable situation. The loss of time, damage to fruit, and expense of cartage to the market, and the recartage of empty cases to the wharf whould handicap this class of growers out of the race altogether. Next to growing the fruit the most important consideration is to find a market for it. This is found, after local consumption is supplied, in export, and this trade is bound to keep pace with the increased production of fruit; otherwise the industry must remain comparatively stationary or retrogressive. To secure the success of the fruit trade every facility must be given to export, and one of the most effective means of accomplishing this is to erect markets in touch with the shipping. Thus the most fortunate thing that has happened is that the Government has not seen its way to resume this most undesirable site, with its inherent disadvantages, and great distance from the common centre of the city. In the event of population increasing, and the city spreading, provision may have to be made for the sale of fruit in larger or smaller quantities in certain centres; but the most imperative requirement of the trade is a wholesale fruit market, such market to possess, as indispensable adjuncts, water frontage to the waters of Darling Harbour with a wharf of its own (for river growers, export and import); *railway* connection, to be situated as near the business centre of the city as possible—and most important—proximity to the shipping. There is only one site at present it appears to me available that possesses the essentials of a Metropolitan fruit market,—that is a property of two and a quarter acres in extent situated in Liverpool-street, forming the corner of Harbour-street (sometimes called Dixon-street). It possesses a splendid frontage to Darling

Digitized by Google

Harbour, and adjoins the Darling Harbour Railway and Depôt. There are approaches from every quarter, with no hills to encounter, and the shipping is within a few minutes of the market. This site would afford the river growers the opportunity of delivering into the market direct, and would also secure to the fruit coming by rail immediate delivery, as the trucks could be brought to the market, or into the market if deemed advisable. Large vessels could discharge into the market, or take up their cargoes of fruit for foreign countries in the development of the export trade. As space is an important requisite it may be pointed out that this land has a frontage of between 800 and 900 feet to Liverpool and Harbour Streets, which would supply storage for grower and merchant. The site has the additional advantage of being near the business centre of the city, and within two minutes' walk of George-street, and not the least remarkable feature is that a site of two and a quarter acres should be available in the business centre of the city.

The selection of this, or a similar site, would keep the different branches of the trade together, the division of which would be a fatal blunder, and lead to the failure of any wholesale fruit-market. There is further the important matter of income to be dealt with. The cost of purchase of site and erection of market must be considerable, and to warrant so large an expenditure an income yielding a fair return on the money to be borrowed should be shown. This can only be accomplished by securing the co-operation of the trade through selecting a position which could be availed of by all, so that each branch would contribute to the market revenue. So far as I can see, and I find on this question that I am in accord with those best able to judge, the only way of securing this consummation is by securing the site indicated, or a similar one. The best method of arranging and constituting a market is only a matter of detail, and is one which, with certain restrictions, an invitation to the architects of the city would soon decide. I trust that this Conference may see its way to take some steps to assist in securing a position for a market possessing the essential requirements that I have endeavoured to point out.

The present inadequate accommodation afforded to this important industry should not be allowed to continue. The drawback has been contended with for many years, but the necessity of providing a remedy has become so pressing that to longer delay must lead to serious injury to the trade. Practically we have the same market accommodation that was deemed sufficient forty years ago, when the trade was in its infancy. Now it takes its place as one of the most important industries of the country, and an intelligent consideration of its wants is demanded. The indispensable requirements of a wholesale fruit market should not be sacrificed to suit the convenience of any section. Every year the trade is increasing in the direction of shipping, and its success in the future depends on the facilities afforded to this outlet. The production is so largely in excess of local consumption that we are compelled to export the bulk of our fruit; hence the necessity of recognising and providing for this contingency in deciding on the locality of the future fruit market.

Mr. Jessep, Sydney, brought under the notice of the delegates cases of apples imported from Tasmania, and he briefly explained the method of packing. The fruit is collected from the trees very carefully, and carried on stretchers to sheds, in which women are employed to wrap and pack it. The

Digitized by Google

varieties shown, were the "Claygate Pearmain," and the "Scarlet Nonpareil," and they were grown by Mr. Shoobridge. These are late fruits, and will keep until September or October.

A discussion upon the papers then ensued.

Mr. LANSDOWNE, Goulburn, said that, in deciding upon a suitable site for a central market, great care would have to be exercised, as so many interests had to be considered. Fruit-growing concerned all because they were all either producers or consumers. This question had occupied the attention of the Goulburn people for some time, and they had sent a petition through the central union in favour of the site known as Inglis' sale-yards, George-street West, believing it to be the most suitable in the interests of the colony. Their great object should be to bring the producer and consumer in touch; first they must teach the people how to grow fruit; next they must obtain a market; and finally suitable buildings. At the present time there was not a surplus of fruit; but in the future, as the industry developed, the production would largely increase. They should study the interests, not so much of the outside world as of local consumers. He did not hold with those who advocated a reduction of railway rates. The rate per ton from Goulburn was 12s., and this was not an exorbitant price. What they most desired was a greater rapidity of transport to the markets, and they intended to ask the Railway Commissioners, during the stone fruit season, to attach a van to the through trains, in order to effect this. He thought it could be done without inconvenience to the public, or making the train much heavier. It was quite certain that unless fruit could be promptly disposed of fresh capital would not be embarked in the industry. It was also necessary that there should be better market accommodation, and, in providing this, the interests of our own growers and consumers should be first considered. The importers, as in the past, would take their fruit to the best market, wherever it was. He did not think it would be wise for the Conference to decide the matter hastily, or to ask the authorities to bind themselves to any particular site; the final decision should only be made, after due consideration had been given to it by both parties, in a reciprocal spirit. The best evidence of the importance of the fruit industry was to be found in the Conference itself.

Mr. CATO, Sydney, said that, as one connected with the export trade, he contended that a water frontage site was indispensable for the future markets, and, in view of this, he considered that the Liverpool-street site, which had been advocated by most of the fruit salesmen, was the best for their purpose. He did not look upon the Conference as being a proper body to settle this question. The municipal authorities had thoroughly threshed out the subject, and he thought that, by leaving the matter in their hands, the best site would be secured. In reference to fruit cases he maintained that the gin-cases at present in use were the best. As a purchaser he would say that if growers sent him more fruit than they should they were paid for it; if they sent less they would be paid less. If fruit was sent to market in the cases suggested by Mr. Roughley, the Melbourne buyers would refuse to purchase that grower's fruit. He had experienced many difficulties in the carriage of fruit; only during last season he had received a large number of cases of grapes—Mr. Scobie would be able to bear him out in this—that had been damaged in transit; and he had been obliged to sell their contents for a shilling, instead of 4s. or 5s., the price it would have realised if placed upon the market in a sound condition. If the Commissioners, as had been proposed, attached a special van to through passenger trains, the difficulty would be largely overcome. The trouble in the past was due to the want of proper care on the part of railway officials, in handling the cases, and the jolting to

Digitized by Google

which they were subjected in the trains. He felt very earnestly upon this matter, because he considered that if the West Maitland grapes could be brought down in safety it would be a great advantage, and could not possibly interfere with locally produced grapes, as they were ripe fully a month previously. This was the argument he used against the action of Victoria in taxing our grapes and citrus fruits, for the fruit seasons varied considerably.

Mr. SPURWAY, Orange, remarked that during last season many boxes of fruit were sent down from Orange in passenger brake-vans, and it was found that the brake action was very detrimental to the fruit. He believed, with Mr. Lansdowne, that no inconvenience would be caused if a van were attached to the passenger train; it would certainly cause no expense to the Commissioners, and it would be a great benefit to the country.

Mr. GRUNSELL, Goulburn, said he had experienced some difficulty in sending fruit to Sydney. Frequently he had found, in spite of careful packing, the amount realised was much smaller than it should have been, and on inquiry he found that this was due to the fruit having been damaged, either in transit or by unnecessary delay. He was of opinion that greater expedition could and should be used in bringing the fruit to market. He quite agreed that it would be well, if possible, to do away with the gin-cases in which fruit was at present packed, but the change should be left to the growers, and not harshly enforced.

Mr. SCOBIE, West Maitland, said the subject under discussion was a very important one. He believed there was a great export trade in fruit to be developed in the future. Some stress had been laid upon the packing of fruit, and the papers dealing with this question should prove of great benefit to fruit-growers, by pointing out to them what to do to avoid failure. Mr. Cato had complained of the bad condition in which the West Maitland fruit reached the Sydney market this year. In the beginning of the season there was some slight trouble, as the trains from West Maitland, instead of going straight through to Sydney, were delayed at Newcastle, the consequence being that the fruit was a day late in the market. Later in the season, when the wet weather set in, a difficulty was experienced in drying the grapes before sending them to market. They had to be laid on tables and strained, and then packed. Fully 25 per cent. of the crop could not be sent to market. They made some representations to the Railway Department, and the result was, that afterwards the trucks were all that could be desired, and there was now no delay in transit. He had no doubt that, if those who had experienced difficulty in the past would only communicate with the Railway Commissioners sufficiently early in the season, they would have their requests promptly attended to, and the department would construct carriages of a type suitable for the conveyance of fruit. Under the old tarpaulin system a sweating and heating process was caused in the fruit which was very detrimental to it, but this had since been remedied. There was one matter to which he would like to draw the attention of the President, and it was the inability of growers to send grapes to the Melbourne market, even if they were willing to pay the duty, in consequence of phylloxera existing here. The sooner the disease was stamped out the better it would be for them all round. A large quantity of fruit came into New South Wales from Victoria, and the grape and the orange were the particular sorts which we could send in return. Our grape season was earlier than theirs, and if the present restriction were removed our surplus could be disposed of in exchange. If the Minister bore this matter in mind he would be doing a good thing for those who cultivated table grapes.

Digitized by Google

Mr. PURSER, Seven Hills, referring to the question of packing-cases, said that he had suffered a considerable loss last year through the non-return of empties. Every fruit-grower suffered more or less from the same cause. He thought that, if a smaller case were to be adopted, and fruit and case were sold together, it would be an advantage to every grower. The gin-case was too heavy and too inconvenient. He was at considerable pains to pack the fruit properly, and he always used paper to wrap it in.

Mr. MACWILLIAM, Corowa, expressed surprise that the Sydney agents were so far behind the Melbourne agents. During the time he had been sending fruit into Victoria he had always used bushel cases. He purchased them just before the season commenced, and after packing the fruit he placed the cases in the train, and that was all he heard of them. This was an arrangement which worked very satisfactorily. He was particularly careful in packing grapes, placing the fruit in the boxes bunch by bunch, and he never had a single complaint from the Melbourne agents. For some time they were bothered about the railway accommodation, but, upon representations to the proper authorities they were allowed the use of vans; he had seen several such attached to the trains, and the fruit was delivered next day in Melbourne.

Mr. CAIRNES, Parramatta, recommended a case for the packing of fruit, similar to that used in America, and which was so made that it could be easily taken to pieces, thus saving storage space and rendering it easy of return. One of these cases, which he would recommend, will hold about 240 selected oranges (32 inches by 15 inches by 11 inches), and the other will hold 288 second sized fruits (31 inches by 16 inches by 11 inches).

Mr. WHITAKER, Parramatta, said that the market question had been thoroughly discussed, and the conclusion arrived at that the most suitable site was the one in George-street West. This site was favoured by the Mayor of Sydney, and it was strongly advocated by Mr. Acres, who was one of the largest fruit-growers in the colony. The importers and merchants should have no choice in the site; the only persons to be considered were the metropolitan housekeepers. What was the use of sending fruit to Darling Harbour or Circular Quay? The consumers did not live there. The only way, it seemed to him, to place the fruit before the consumers, was to secure a central market, and on such a site as the fruit-growers had selected. The property he had referred to was within a quarter of a mile of Darling Harbour; it had a large frontage to George-street West, and it had the advantage of railway facilities. As an argument in favour of this position, he pointed out that the population of the city was 127,449, while that of the suburbs was 239,235, and it was in the direction of the suburbs that the city was growing. He quoted figures to show that the quantity of fruit coming into Sydney by rail exceeded that coming by water, and contended that it was the duty of the Mayor to secure the best possible position for the new markets. The Liverpool-street site, which was advocated by the importers, had been condemned by the City Council. He repeated that no better site could be selected than that in George-street West.

Mr. STIEME, Fairfield, remarked that, in choosing a site for a market, it should be borne in mind that the fruit carried by rail was in excess of that carried by water, and as the railways developed so would that excess be magnified. The sections of the community whose interests should be considered in this matter were the consumers and growers. In reference to the Tasmanian fruit, brought under their notice by Mr. Jessep, he considered that the export trade from that country would decrease, as only inferior

Digitized by Google

varieties were sent to Australia. The site for markets which had been mentioned by Mr. Whitaker, was an admirable one, and when the markets were erected the consumers should be able to go there and obtain their fruit at first cost. He did not see why the merchants should get all the profit. Personally, he was in favour of the George-street West site, but he hoped that whichever one was decided upon it would be in such a position that it would be accessible for both growers and consumers.

Mr. RELTON, Armidale, said that, in any scheme which was determined upon, the interests of New South Wales should predominate. While they had no objection to Victoria or any other country sending fruit here if it suited them, the object of the authorities should be to secure the best possible markets for New South Wales produce, combining with this the most convenient site for purchasers. It seemed to him, from what he knew of the two sites that had been mentioned—and he had known both for the last thirty-five years—the best in every respect was that known as Inglis' sale-yards. It could not be expected that purchasers would go into Liverpool-street when they could obtain what they required from the retail shops in any part of the town. If the importers required a depot for their fruit they ought to receive some consideration, but the site chosen should be a central one, and sufficiently extensive, not only for present but for future requirements. While this was a matter for the municipal authorities rather than for the Government, he considered that it was not out of place to discuss it at this Conference.

Mr. BENNETT, Hawkesbury, said that all the fruit from the Hawkesbury was brought to Sydney by water. Why, he asked, should those who had the benefit of the railway put a tax of something like 3s. 6d. per load upon the fruit when it came into the market; and that was what would happen if Inglis' sale-yards were selected as a site for the new markets. The railway would run right into the market, but water-borne fruit, which was not necessarily all imported, would have to bear the cost he had mentioned. This was a question of some importance, and should be fully considered. He could quite sympathise with the feeling which had been shown in the matter, but at the same time the interests of those colonists who had not the advantage of railways should not be overlooked. He agreed with Mr. Purser that it would be a very good thing if a smaller packing-case were adopted by growers, and he was of opinion that each grower should stamp his cases with a recognised mark, for to do so would make them more careful in packing and selecting the fruit which they sent to market.

Mr. JOHNSTON, Singleton, suggested that some such resolution as the following should be adopted: "That this Conference recommends the Government to procure the best possible site for wholesale markets, and one having both rail and water facilities." The country districts should receive as much consideration as the fruit-growers of Central Cumberland. Those gentlemen who had fixed upon the George-street site were standing in their own light, because in years to come fruit would be distributed all over the colony instead of being sent to one or two local markets, as at present.

Mr. JESSEP, Sydney, in reply, pointed out that in his paper he had given prominence to the importance of water facilities, in the selection of any site for a metropolitan fruit market. He had mentioned two places which possessed this advantage, and the Liverpool-street site seemed to be the more suitable. He controverted the statement made by Mr. Whitaker to the effect that the Mayor had approved of the George-street site. He received a letter from the Town Clerk only yesterday, informing him that the Mayor desired to see three delegates, appointed by the merchants and growers, to

Digitized by Google

meet and discuss the whole question at an early date, in order that some amicable decision might be arrived at, and united action taken. His Worship desired that his hands might be strengthened by the unanimous support of the different associations in any scheme he might bring before the Council for their approval. Did that appear as if the Mayor had settled the question, as Mr. Whitaker had stated? He asked the Conference to pause before asking the Minister for Agriculture to interfere in this matter. It must be settled by some such amicable arrangement as the Mayor had proposed.

Mr. CAIRNES, Parramatta, read the following remarks, which had been handed to him, bearing upon the packing of fruit:—"The Californian orange-growers who ship citrus fruit across the Continent to New York, do not, in any case, expose the oranges to the sun's rays to cure them. On the contrary, they are first dried a little after cutting from the tree, under its shade, spread in some straw, and then removed to an air-tight drying-house, and spread on shelves, and allowed to dry and sweat. In most cases they are taken direct from the tree to the drying-house."

Mr. STIMSON, Fairfield, expressed himself as favourable to the George-street site. He did not think it likely that the country would sanction the purchase of the Liverpool-street site for central markets.

Mr. CAMPBELL, Blacktown, suggested that, as an experiment, some fifty growers should each forward to the department twenty cases of fruit, packed in different ways, and with an explanation of the method adopted, and that the Department of Agriculture should forward the fruit to the London market as an experiment.

Mr. ROUGHLEY, Dural, remarked that Mr. Grunsell seemed to be of opinion that the system he proposed, of smaller packing-cases, should be allowed to come into operation gradually. He believed that the change should be made compulsory, in order that benefit might at once be derived from it. He was of opinion that the Liverpool-street site was the best which had been offered on which to erect metropolitan markets. All the papers which had been contributed upon the packing of fruit seemed to urge that any benefit which would be derived from improved packing would be mutually shared by exporters and growers: so that, if the Liverpool-street site offered advantages to the exporter, it must possess advantages for the grower. As he had pointed out, the more expense which attached to exporting, the less fruit would be exported; so that, if they took the markets away from the wharfs, and thus put the exporters to expense for carriage, the export trade would necessarily be curtailed. The Liverpool-street site possesses many advantages and was admirably suited to the requirements of the trade. Both the importer and the exporter had to be considered in a matter of this kind, and, although there were some who did not care to facilitate the interests of those who were bringing fruit into the colony, it should not be forgotten that this was a Free-trade colony, and the interests of the whole community should be studied, not a section of it only.

Mr. CLEGHORN, Uralla, commenting upon the question of cases, said that for the last two or three years he had sent fruit away without looking for the return of the case. He took it that the price of the case was included in the price of the fruit. Something should be done to define the size of the case and the manner in which the fruit should be sold. At present quotations were given at so much per case, and, as there was no standard size, it was difficult to ascertain the actual price of the fruit. Most growers secured their cases second-hand, and thus they were exposed to the great danger of disseminating and propagating pests. He had commenced to make his own cases, and he would like to send out all

Digitized by Google

his fruit in new boxes, if the timber were only procurable. As to the position of the markets, he had always maintained that fruit should be disposed of by auction, and he had endeavoured to induce one or two merchants to include it in their lists and submit for auction like other products. In any markets which were built, both rail and water carriage should be secured. He thought it would be premature for the Conference to settle the question. A mistake had been made, it seemed to him, in attempting to combine a wholesale and a retail market. Retail markets were obsolete. The need of the present day was rapidity of distribution, and this was shown in the hundreds of fruiterers' shops which were scattered all over the city. It was ridiculous to assume that purchasers would all flock to one centre to make their purchases. What was needed was a commodious and convenient wholesale fruit market, and, in determining upon a site, they should conserve the interests, not of any particular section but of the whole country.

This concluded the discussion.

Digitized by Google

Miscellaneous Subjects.

Fruit Candying Industry at Leghorn (Italy).

A. P. REYNOLDS, B.A.

THE following information with reference to this important industry has been obtained at the instance of the Agent-General from the British Consul at *Leghorn*, through the British Foreign Office.

Leghorn occupies the first place in Italy, and perhaps throughout the Mediterranean, for the preparation of the candied citron and orange peel, so largely used in all branches of confectionery. I find, however, that the fruit itself, and every ingredient and article necessary to the preparation of the candied peel are imported into Leghorn, which provides nothing but the labour necessary to the manufacture. It is worthy of note that the best quality of fruit for candying purposes is imported from Corsica, and the worst from the African Coast; for the fruit obtained from the latter place is generally larger than the favoured varieties with a smooth instead of a rough granulated surface, characteristic of the citron, and probably somewhat deficient in the essential oil, which forms the medicinal property of, and gives the flavour to the rind.

I shall, perhaps, convey the clearest impression of the treatment of the fruit, and the processes through which it passes if I follow it through the various stages of its preparation, from its arrival at this port to the moment of its departure hence in cases filled with boxes neatly packed with the cut candied-peel.

In all the countries which export to this place the raw fruit for this industry it is treated in the following manner. The fruit is simply halved and placed in hogsheads or large casks filled with a fairly strong solution of brine, the fruit being halved merely to ensure thorough preservation of the rind by an equal saturation of the interior as well as the exterior surface. In these casks it arrives at the doors of the manufactory.

The first process to which it is then subjected is the separation of the fruit from the rind. This is done by women who, seated round a large vessel, take out the fruit, skilfully gouge out the inside with a few rapid motions of the forefinger and thumb, and, throwing this aside, place the rind unbroken in a vessel alongside them.

The rind is next carried to large casks filled with fresh cold water, in which it is immersed for between two and three days to rid it of the salt it has absorbed. When taken out of these casks the rinds are boiled, with the double object of making them tender, and of completely driving out any trace of salt that may still be left in them. For this purpose they are boiled in a large copper cauldron, for a time varying from one to two hours, according to the quality of the fruit and the number of days it has been immersed in brine. When removed from this cauldron the peel should be quite free from any flavour of salt, and at the same time be sufficiently soft to absorb the sugar readily from the syrup, in which it is now ready to be immersed.

Digitized by Google

The next process to which the rind is subjected is that of a slow absorption of sugar, and this occupies no less than eight days. Needless to say that the absorption of sugar by fresh fruit in order to be thorough must be slow, and not only slow but must also be gradual. That is to say, the fruit should be a first treated with a weak solution of sugar, which may then be gradually strengthened, for the power of absorption is one that grows by feeding. The fruit (and this holds good more especially with the rind) would absorb with difficulty, and more slowly and unequally, if plunged at once into a thick syrup, than if gradually treated with weak solutions easier of absorption, and by which it has been thoroughly permeated first. It is a knowledge of this fact that governs the process I now describe.

The fruit has now passed into what I may call the saturating room, where on every side are to be seen long rows of immense earthenware vessels, about 4 ft. high and 2½ ft. in extreme diameter, in outline roughly resembling the famed Etruscan jar, but with a girt altogether out of proportion to their height, and with very short necks and large open mouths. All the vessels are filled to their brims with citron and orange peel in every stage of absorption, *i.e.*, steeped in sugar syrup of, roughly speaking, eight different degrees of strength. I said before that this is a process that occupies almost always eight days, and as the syrup in each jar is changed every day we may divide the mass of vessels before us into groups of eight. Take one group of this number and we are able to follow the fruit completely through this stage of its treatment. With vessels of such great size and weight, holding at least half a ton of fruit and syrup, it is clearly easier to deal with the syrup than with the fruit. To take the fruit out of one solution and to place it into the next stronger, and so on throughout the series, would be a toilsome process, and one moreover injurious to the fruit. In each of these jars, therefore, is fixed a wooden well into which a simple hand suction pump being introduced, the syrup is pumped from each jar daily into the adjoining one.

"How is the relative strength of the syrup in each jar regulated" is the next question. "The fruit itself does that," is the foreman's reply; and this becomes clear from the following explanation. Number your group of jars from one to eight respectively, and assume No. 1 to be that which has just been filled with peel brought straight from the boiler in which it has been ridded of the last trace of salt, and No. 8 to contain that which, having passed through every stage of absorption but the last, is now steeped in the freshly prepared and therefore the strongest solution of syrup used in this stage.

"We prepare daily a syrup of the strength of 30 degrees, measured by the 'provino'"* continued the foreman; "and that is poured upon the fruit in jar No. 8. To-morrow the syrup from this jar, weakened by the absorption from it, by the fruit of a certain proportion of sugar, will be pumped into jar No. 7, and so on daily through the series. Thus No. 1 containing the fruit will be treated with the weakest solution of syrup, and the fruit itself regulates the strength of the syrup, as I said." "But if the syrup has lost all its strength before the seventh day, or arrival of jar No. 1" we ask. "Care must be taken to prevent that, by constant testing with the 'provino,'" is the reply; "and if that is found to be the case, a little stronger syrup must be added to the jar."

A slight fermentation next takes place in most of the jars, but this, so far from being harmful, is regarded as necessary, but of course must not be allowed to go too far.

* A graduated test for measuring the density of the syrup.

Digitized by Google

There is yet another stage, and that, perhaps, the most important, through which the peel has to pass before it can be pronounced sufficiently saturated with sugar. It is now boiled in a still stronger syrup of a density of 40 degrees by the testing-tube, and this is done in large copper vessels over a slow coke fire, care being taken to prevent the peel adhering to the side of the vessel by gentle stirring with a long paddled-shaped ladle. This second boiling will occupy about an hour.

Taken off the fire the vessels are carried to a large wooden trough, over which is spread a coarse, open wire netting. The contents are poured over this, and the peel distributed over the surface of the netting, so that the syrup—now thickened to the consistency of treacle—may drain off the surface of the peel into the trough below. The peel has now taken up as much sugar as is necessary.

Now comes the final process, the true candying, or the covering of the surface of the peel with the layer of sugar crystals which is seen upon all candied fruits. To effect this a quantity of crystallised sugar—at Leghorn the same quality of sugar is used as is employed in the preparation of the syrup—is just dissolved in a little water, and in this the now dried peel taken off the wire netting is immersed. The same copper vessels are used, and the mixture is again boiled over a slow fire. A short boiling will suffice for this, the last process, for the little water will quickly be driven off, and the sugar upon cooling will form its natural crystals over the surface of the fruit. Poured off from these vessels it is again dried upon the surface of the wire netting, as before described. The candying is now complete, and the candied-peel is ready for the packing-room, to which it is carried off in shallow baskets.

In the packing-room may be seen hundreds of boxes of oval shape, or, if I may so speak, of rectangular shape, with rounded corners and of different sizes, for each country prefers its boxes to be of a particular weight, Hamburg taking the largest, of 33 and 66 lb., the United States of America preferring smaller, of 22 and 26½ lb., whilst England takes the smallest, of 11 lb., and one containing about 7 English pounds. The wood of which the tops and bottoms of these boxes are made comes to us in thin planks from Trieste, and a skilful workman, paid 2s. 4½d. a day, will complete seventy boxes per diem. The picking is generally done by women, and the boxes are lined with white paper. They are then packed in cases of 220 lb., ten of the smaller American boxes filling a case. The candied-peel is now ready for export.

Fruit Preserving.

C. W. HILL, Sydney.

THIS Colony producing some of the finest fruits in the world, and sugar of an excellent quality for the purpose of fruit preserving, should be able to place her preserves in the Home markets in such quantity and of such quality as to entirely shut out the foreign article, and also to hold her own in any market in the world. Does she do so? If not, why? Simply because many of the persons who embark in the industry are totally uneducated to the business. Of course there are exceptions, but there are manufacturers with any amount of money at their disposal, paying men high wages for work they do, but imperfectly, through ignorance. The result of this is that the market is glutted with an article that is a disappointment to

Digitized by Google

the purchaser, and tends to bring disrepute on the Colonial productions. (Not only should the preserver be proficient in the art of fruit preserving, but the grower should be educated to his business, so that he may know which varieties are most suitable, and also supply the preserver direct from the orchard; thereby saving him the necessity of having to depend upon a glutted market to obtain a supply, which is very often the case at the present time.) Look at the vast amount of money paid for imported preserves in this Colony every year, which amounted in 1889 to £31,969 as under:—

PRESERVES and fruit (boiled or pulp) imported into New South Wales during 1889.

—	Weight.	Value.
	lb.	£
Great Britain	170,588	3,280
Victoria	20,134	597
Queensland	5,312	138
South Australia	73,475	1,799
United States	1,387,379	20,749
Hong Kong	170,012	4,669
Germany	184	4
Fiji	1,416	33
Tasmania	35,031	607
France	240	40
New Zealand	1,512	36
India	20	2
Ceylon	196	12
Canada	144	3
Total	1,865,643 lb.	£31,969

It is astounding, for we have every facility for preserving. The advantage of this way of disposing of the fruit too is that the small and ill-grown fruit, which is almost unsaleable in the market, if sound, can be used up as well as the largest and best grown. Thus the cheap fruit, which tends to impede the sale of the better sorts, would be kept out of the market. (Very large profits are to be derived from this industry if skilled labour is employed, and sound ingredients are used, for it is a mistake to think that sound preserves can be made out of rotten fruit.) To secure a good profit too, all kinds of preserves must be made, including jam in tins and in bulk, jellies, tart-fruit, desserts, marmalade, candied orange-peel, crystallised and dried fruits, together with sauces and pickles—all of which, if properly manufactured, will find a ready market both at home and abroad at profitable prices. At present there are preserves sold at very cheap rates—even below the mere cost of manufacture—and it stands to reason that they cannot be sound or are composed of very inferior articles. Very naturally people will want to know how this can be prevented. I think it could be done very effectively by appointing as Government inspectors men who are experts in the fruit industry, and who have gained their knowledge by practical experience. These inspectors should inspect all fruit coming into Sydney or offered for sale in the market, condemn all diseased fruits and have them destroyed. This would also prevent the spreading of some of the diseases which have been so destructive in many of our orchards. If you go to the Sydney market you will see large quantities of fruit that has to be disposed of at any price offered—usually about a

Digitized by Google

shilling for a case of 5 pecks. It is incomprehensible why such a state of things should be, for the preserver can—even quoting the very lowest price—pay the growers 3s. per case for every kind of sound fruit. It has been stated that the orange is a most useless fruit for preserving purposes. This I emphatically deny, for every variety of the citrus tribe can be used for preserving, even to the pip. What I would impress on the Department of Agriculture is that provision should be made in the Agricultural College and Model Farms in agricultural districts for the holding of classes in which those desiring it could obtain practical knowledge of fruit-preserving in all its phases. Then the grower would have no occasion to send ill-grown fruit to the market at all; but, after supplying his own requirements with good fruit, could send the surplus to market in a preserved state. For such he would find a ready sale at a price that would amply repay him for the trouble.

Fruit Preserving.

G. V. RAHN, Germanton.

In submitting this short paper to you, at this Conference, it is with the hope that good may result, and any hints herein contained may cause the public to follow up and further investigate this important industry of fruit preservation, which at present is only in its infancy, but which, I feel certain, if properly brought before fruit-growers, will enable us to compete with California and other fruit-preserving portions of the world; and if the means and methods of doing the work properly are laid before the producers, so as to educate them, they must, if they put into practice what they learn, meet with deserved success.

Statistics are dry matters; but they are useful, and open our eyes to facts of which many are unaware, especially in regard to the fruit-preserving industry which is annually increasing in importance. The following figures I have gleaned from a useful work on "Modern Preserving Processes," edited by Courtnay Smith, Popular Science lecturer. He states:—"Although New South Wales is nominally freetrade, she has a protective duty of no less than 2d. per lb. on dried and candied fruits, and 1d. per lb. on preserves, jellies, and boiled fruits.

"The Sydney imports of dried, bottled, and candied fruits totalled:—

"1887—6,835,000 lb.; shipping value, £102,674; duty, £56,605.

"1888—7,026,360 lb.; shipping value, £103,006; duty, £58,553.

"From this it will appear that the duty paid is at the enormous rate of 56 per cent., sufficient, one would suppose, to encourage the development of any industry. However, this is not taken advantage of, except in a very small degree.

"The total imports of fruits, fresh and preserved, without duty, in 1887, were £273,128; and in 1888, £270,914; but in the latter year canned fruits were erroneously included with 'fruits in pulp,' so that the actual amount was much larger. The duty paid, wholesale, value of dried, bottled, candied and otherwise preserved fruits imported into New South Wales in 1887, was about £235,000, and in 1888 about £242,000. Of these the major portion could have been grown and preserved in the Colony at a profit, say £75,000. Of course it is not to be expected that old customs are going to be changed in a year, or even ten years, wholly; but it is certain much might be done right away."

Digitized by Google

Amongst the various openings for profitable trade may be mentioned:—Dried figs, prunes, quinces, peaches, ginger, apricots, citrons, plums, lemon-peel, currants, raisins, bananas, tomatoes, sweet corn, apples, almonds, nuts, vegetables, and many others that may suggest themselves to the fruit-preserver.

Fruit preserving may refer to either evaporated fruit, or bottled and canned fruit, and candied fruits.

Evaporated fruit may be termed ripe fruit from which the moist, watery, constituents have been drawn away by artificial means, such as exposure to heated air in machines termed evaporators, or else by exposure to the sun's rays in the open air.

The evaporator's action with regard to fruit drying depends upon heated currents of air being allowed to circulate beneath and around the fruit, which after being carefully picked is placed on wire trays in the machine. Attention must be paid to the work, and as the lower trays of fruit part more rapidly with their moisture, they must be gradually removed further away from the source of heat, until they are completely dried and prepared for packing. Of evaporators, there are three classes in general use—the "Vertical," "Inclined Flue," and the "Horizontal." There is also, I may state, a Victorian machine termed the "Rotary." In evaporating fruit care must be taken not to allow the steam from the lower trays to ascend and pass through and around the various trays above, thus steaming, cooking, and soddening the contents; for the vapour expands, finally bursts the cells, and by exposure causes oxidisation, as well as dispelling the essential oils.

Information of various machines may be obtained from machinery merchants in Sydney. Fruit dried in the open air by means of the sun has from early ages been in general household use in other countries, and is most prevalent amongst the selectors in the country districts, who are unable to find a market for fresh fruit. Owing to the many drawbacks attendant upon this method much loss is occasioned to the producer, for there are many cases in which, through long exposure to the sun, fermentation setting in, causes the starch and sugar to turn to vinegar, while myriads of insects prey upon the fruit, laying their eggs, and with dust and dirt render it disagreeable to the eye, and unwholesome to the stomach.

For successful fruit drying in the open air a hot dry climate is necessary, while in an uneven climate, where the rain is uncertain and liable to fall at any moment, "fruit evaporators" or "driers" are necessary.

The bottling and canning of fruit are industries that have received much attention, and are capable of further extension. The fruit if desired for table use in puddings and pastry should be preserved in "water," and care should be taken to have the jars or tins perfectly air tight, otherwise the action of the atmosphere would spoil it. Fruit may also be preserved in "syrup," and in this state form an attractive dish for the table, without further cooking.

In connection with fruits in water or syrup care must be taken to use only perfectly fresh, sweet, sound fruit. It should not be kept overnight in close, stuffy rooms, and should not be over ripe.

Absolute cleanliness is requisite in regard to all jars, bottles, and cans used. They should be well washed, and in the case of patent bottles, such as "Mason's jars," gradually warmed until quite hot, so that the hot fruit may not be suddenly cooled, nor the glass cracked by sudden expansion. Each bottle should receive attention for a few days, and the tops be tightened up, as they will through contraction often be found loose.

Digitized by Google

If corks are used they should be covered with bladder tied over, or else with bottling wax. Whether for sale or private use neat labels and packages are necessary to readily distinguish the varieties.

Bottled and canned fruit should be kept in cool dark quarters, where it will not be exposed to extremes of heat and cold. It is believed that the action of sunlight causes fruit and vegetables to ferment. In canning fruits great care should be taken to drive the air out, and when soldering to avoid carelessness in allowing the spirits of salts or soldering fluid to enter the can and poison the fruit.

For sale purposes, neatness in design, bright attractive labels, stating contents of package, are essential to catch the public taste; in fact appearances is one of the main points in success.

Candied fruits should succeed well if taken in hand properly; they are heavily protected, so that a good supply of fruit at a low price should enable an extensive profitable trade to be carried on in this Colony. It is a notable fact that lemons in brine are imported in quantities from the Mediterranean and candied here, showing that either our supply of green fruit at a reasonable price is not equal to the demand, or that our preservers have not properly taken the matter in hand.

The process of candying fruit is a simple one, but would take too long to thoroughly describe it here, except to say that the fruit is halved, placed in hogsheads in which is a brine solution, next, after being well saturated, the fruit is separated from the rind. Then the rind is placed in a cask of fresh cold water for two or three days to free it from the salt absorbed. Next it is boiled in a cauldron, to completely free it from salt or traces of it. After this it is placed in a cask to absorb sugar, which is in a weak syrup first, finally being heavily strengthened to a thick syrup; then allowed to ferment slightly and boiled again in a stronger solution of syrup of a density of 40° as shown by testing tube; taken off the fire, the fruit-rind is allowed to drain and dry upon wire-netting, until it is ready for the final process of covering with sugar crystals, by means of crystallized sugar-solution, in which the rind is again boiled and allowed to drain and dry, when it is ready for packing. (*See* "Modern processes Fruit Preserving," published by T. W. R. Clarke, George-street, Sydney.)

Vegetables as well as fruits may be preserved by canning and evaporating, and should receive their due share of attention.

Now, having described briefly the various sorts of fruit-preserving, I desire to suggest that, as the result of my observation in the districts of the Hume electorate, and which may also refer to other districts of this Colony, the fruit-growers should not trouble themselves so much in the matter of supplying the Sydney markets, which trade they cannot expect to derive much benefit from, being heavily handicapped by the matter of railway freight, and in many instances cartage of 10, 20, or 30 miles to the railway station, whereas the fresh fruit can be quickly and easily placed on the markets of Sydney by the Cumberland District fruit-growers. For, what with a long journey in close stuffy vans, and being carelessly handled and indifferently packed, the fruit is often in anything but a saleable condition, so that it has to be sacrificed at a ruinous price, or else thrown into the rubbish heap, whereas, if these growers from up country would first supply their local market, and then make use of their surplus by drying, bottling, and candying, they would be enabled to hold on if the price offered was deemed unsatisfactory, for it would not be a perishable article like the green fruit.

Digitized by Google

It would also stand long sea voyages, and be enabled to compete in the European markets, if taken in hand on a large scale. To ensure success it would be necessary for a company based on a co-operative system to undertake the business in each district, fruit-growers themselves to be directly interested in such undertaking, and to agree to sell their fruit at a reasonable rate during the season, otherwise the same trouble may be experienced that I am informed has taken place in the Hawkesbury district, where a gentleman had started a fruit-preserving and canning factory, but owing to the exorbitant price asked by local fruit-growers, and in many cases refusal to sell to him, they preferring to allow the fruit to rot in the orchard and go to waste, he has been compelled to send to Tasmania for a large consignment of fruit for preserving. Such a state of affairs is very unsatisfactory, and if the industry is to succeed, both grower and consumer must work hand in hand with the fruit-preserver.

Situated as residents of the Hume District are on the border of the Colonies of New South Wales and Victoria, suffering from the difference of fiscal policy and the imposition of differential rates, they are most awkwardly placed, and I would suggest to the fruit-growers that it is unwise to look to Sydney as their market, instead of to such districts as those of Hay, Bourke, and Wilcannia, where, owing to the climate, they are unable to raise English fruits successfully. From what I have seen and know of the Coolamon-Narrandera line, large quantities of fruit are sent to those districts from Sydney and other distant places, whereas the market would be in our favour as regards distance and getting the fruits direct. One thing I would point out, and that is the Agricultural Department must represent to Commissioners of Railways in New South Wales the advisability of studying the requirements of the fruit-growers and vignerons of the various districts of our Colony, giving them decent conveyances, quick and reasonably cheap transit, and in every way possible encouraging the use of the railways for distribution of the products of one district into another, thus benefiting their revenue and the fruit-growers of the Colony of New South Wales.

In conclusion, I believe that much good may be done by the Department of Agriculture working with the various Pastoral, Agricultural, and Horticultural Societies throughout the Colony, distributing information and collecting the same, giving practical lectures and demonstrations with exhibits at the annual shows when large numbers are congregated together, one hour's practical explanation being of more service than all the pamphlets printed and circulated up to date. Practical lecturers such as those travelling in Victoria with the travelling working dairy might with advantage be adopted here for giving instruction in each centre of industry.

The Agricultural Societies might on their part do much to encourage by offering special prizes to induce exhibition of improved methods and appliances and competition amongst the fruit-growers of each district. In this matter I might state that the society at Germanton, which I have the honour to represent as their Secretary, have this season included fruit evaporators, fresh fruits, dried fruits, as well as fruits preserved in water and syrup, and I feel certain this will be a most important section in our annual show of 1890, as well as in future years. The subject of jams and jellies I have not touched upon, although they may come under the head of preserved fruit. Much might be said for them; but if I have caused any who may have heard or read this paper to study the matter and embark in fruit preservation, I shall feel satisfied and thankful that my labours have not been in vain.

Digitized by Google

Correct Nomenclature of Fruit Trees.

C. GAMBLING, Thornleigh.

THE subject of this paper, considering that the fruit-growing industry of this Colony has reached such great proportions, and yet is only in its infancy, that it may justly claim a place among the first industries of the Colony, is of very great importance, not only to the fruit-grower but the consumer, and the correct nomenclature of fruit trees would therefore confer a boon on every one.

But at present, when trees are wanted, you get a catalogue from one or more nurseries, and in selecting the various sorts required, you are guided by some of the standard works on this subject. You plant your trees, and then after waiting from two to ten years or more, find to your dismay that many of them are practically worthless for orchard purposes, in fact are anything but the sorts expected. You have either to root them up and begin again, or cut them off and regraft. The vexation, loss of time, and above all the pecuniary loss yearly, if it could be ascertained, would amount to something astounding, but it is still going on year after year unchecked. But to return. Perhaps you decide to regraft—and wisely too; then comes the question: Where are you to get the desired scions from? You would be naturally very cautious this time; and all I can say is that I know of no place in this Colony where you could be morally certain of getting the right sorts. I have, like a good many others, bought trees in Sydney, and on discovering they were wrongly named made complaint, and have been coolly told they did not guarantee anything, as they were only plant merchants. Again, I have been to some of our old established nurseries, and my experience has been this, they have been little if anything better than some of the plant merchants. Such is one of the difficulties of the fruit-grower, and I believe it is one that is very sorely felt by almost every one of them. In a letter I received from Mr. George Neilson, the curator of the Royal Horticultural Society's Gardens, Richmond Park, Victoria, dated 25th July, 1889, he says, "I am often sorry that there is not a better understanding between the fruit-growers of the different Colonies, and they do not try to have a correct fruit nomenclature. It is very confusing to find that New South Wales, South Australia, Tasmania, and Victoria have, in some instances, to my knowledge, a different name for the same varieties. I could see in the collection of modelled fruits sent from New South Wales to our Centennial Exhibition that many of the names were wrong, and ought to be rectified, as it has a tendency to mislead inexperienced planters, and cause them to plant what they probably ought to avoid.

Again, another difficulty is this: the almost endless number of seedlings which have been raised. A few of them, no doubt, are worth growing, perhaps one or two per cent.; but unless tested, compared, and classified by some competent authority, each one consider his own seedlings the best. Oftentimes a seedling is claimed by one or more persons, and thus at the start it has more than one name, making confusion worse confounded. All these seedlings require testing, and those that are worth growing should be registered with the raiser's name attached, with every particular as to how, when, and where, &c., so that the whole history of it should be known if possible, as it may be a guide to others, while all the rest should be discarded. Another difficulty is that oftentimes some old sort (perhaps discarded as worthless) is renamed, and under the new name is again cultivated, only to cause further disappointment. These have been some of the difficulties under which the grower of fruit has laboured in the past.

Digitized by Google

Now for the cure of this very great evil: in the first place I would suggest that the Government procure a complete set of models of all fruits suitable to this Colony, so that every grower could readily compare any variety he may have with them, and be certain that his fruits were rightly named. But the best way is for the Director of Agriculture to begin at once and plant a piece of ground with specimens of the various kinds of fruit trees, so as to test each variety as to whether it is suitable for commercial purposes or otherwise, on very much the same lines as the Royal Horticultural Society of Victoria are doing at Richmond Park, where they have over 700 kinds of apples, 400 pears, 54 apricots, 27 nectarines, 146 peaches, 167 plums. These are only some of the fruits that are grown there for testing purposes. From such a list could be fairly told what to grow and what to avoid in the various districts of the Colony. It would be such a school as the fruit-growers would be only too happy to learn from, and it would soon lead to the discarding of a lot of almost worthless trees of all kinds. The location of such a garden (if only one is formed) should not be at too great a distance from Sydney, and if possible easy of access by rail, containing both poor and rich soils of every aspect, so as to vary the testing conditions as much as possible. Such a garden in charge of a thoroughly competent man, whose heart was in the work, would, I think, soon bring about a very great change in the practice of the majority of fruit-growers, which would benefit, not only them, but indirectly the whole community.

Inspection of affected Fruit coming into the Colony.

C. A. JACKES, Armidale.

I BELIEVE that one of the principal objects of this Conference is to find out the best and least expensive methods of preventing the increase of, and if possible destroying all pests injurious to fruit-trees, vines, and fruit; and I think that the prevention of imported affected fruit should be the first step taken.

It would be a very hard thing indeed for the fruit-growers of this colony to fight against the increase of these pests, more especially the codlin moth, if other colonies and countries are to be allowed every week to land tons and tons of fruit affected by, and containing this moth in one of its stages; and then for this affected fruit to be resold and distributed throughout the length and breadth of the colony, spreading the pest wherever the cases are opened; so that after a grower has spent time and money in destroying the pest in his orchards a fruiterer in his district may receive a consignment of imported fruit, and so renew the stock of moths that the grower has worked so hard to destroy.

To prevent all this I should suggest that inspectors be appointed to open and inspect one or more cases of every consignment of fruit coming into the colony either by land or water, and if the fruit is found to be affected to have it, also the cases and packing destroyed.

The following discussion then ensued,—

Mr. STIEME, Fairfield, said the fault that the fruit was not properly named lay with the growers themselves. He felt sure Mr. Anderson would leave no stone unturned to secure a proper naming of trees, and in his effects he ought to be heartily seconded by the growers. He suggested that during

Digitized by Google

the coming summer they should send to the department specimens of fruit from the parent stock and also from seedlings. He would do this himself; and in addition he would forward the correct name where he knew it, but if there was any uncertainty about it he would refrain from doing so.

Mr. JESSEP, Sydney, stated in reference to the inspection of fruit that he was thoroughly in accord with Mr. Jackes. No one had a deeper sense of the necessity for inspecting fruit from the other colonies than he. During a recent visit to Tasmania he pointed out to the growers there the absolute necessity of exercising care in the selection of the fruit, and he gave them to understand that if he detected any diseased fruit arriving here he would make it his duty to purchase and reship it to them. Up to the present he had not seen any affected fruit which had come from Tasmania, but he anticipated serious trouble from California. A great deal of American fruit passed through his hands, and he regretted that no provision had been made to prevent this colony becoming a receptacle for the rubbish of other countries. In some cases from California he had seen no less than from a dozen to a score of grubs, and he had seen many cases in which the fruit was riddled by the codlin moth. He could assure the Conference that the utmost vigilance was being shown by the authorities in Tasmania in this matter. The fruit-growers had a cure for the trouble in their own hands. Whilst they might legislate to prevent further inroads, they should unite to eradicate the codlin moth by informing the authorities wherever any of the pest appeared. He hoped that the plea contained in Mr. Jackes' paper would receive the serious consideration of the Conference, and that a practical resolution would be adopted embodying that recommendation for the Minister to do his utmost to introduce a measure dealing with the question.

Mr. RELTON, Armidale, expressed his pleasure at the remarks made by Mr. Jessep. The necessity that the Government should be alive to their interests had been clearly shown, and also that a proper step had been taken in bringing such a question before the Conference for consideration. All that remained was for the department to follow out the suggestions which had been offered. The codlin moth had already obtained a hold in the country; it was their duty to try every means to get rid of it, but they must first see that its further introduction into the colony was prevented. It appeared to him from what Mr. Gambling had stated in his paper that he had not been fairly treated by the nurserymen. He was happy to say that his experieuce was the reverse of this.

Mr. PYE, Parramatta, indorsed what Mr. Gambling had said with regard to the difficulty of obtaining the proper varieties of trees from nurserymen. It was a hard thing when a man had planted his orchard to discover that the trees he had obtained from the nurseryman were not those he had ordered.

Mr. BEATTIE, Wagga, said he considered that some steps should be taken to prevent those living in the country from being gulled by nurserymen. Some four years ago he received a catalogue, and he picked out from the lists certain trees which he thought would suit his orchard. The trees arrived, and were planted, and when they began to bear, he found that only in one instance had he got the proper variety. He wrote to the nurseryman, complaining of this, and was informed that the kinds he had ordered were sold out, and that those sent were the nearest they had.

Mr. BUCHOLTZ, Mudgee, gave a similar experience, and added that in the Mudgee district there were thousands of trees which were just coming into bearing, and which were worthless from the same reason. Such a state of affairs was a serious drawback to the cultivation of fruit in this colony, and

Digitized by Google

most discouraging to those who were pursuing the industry, and expecting a return in five or six years. Now that a Department of Agriculture had been established, it would be a good plan if a stock of the best known varieties of fruits was kept by the authorities, so that those who did not care to go to nurserymen might be supplied with scions, of course always having regard to the district in which the fruit was to be grown.

Mr. GAMBLING, Thornleigh, in reply, repeated his complaint against the treatment which growers received at the hands of nurserymen. He was certain that in his district there were scores of orchardists who had experienced similar treatment, and the consequence was that nearly everyone expressed a feeling of distrust at purchases made in this way.

This completed the discussion of the foregoing subjects.

The PRESIDENT said: During the evening three resolutions have been handed to me, which were agreed to by the delegates in Committee this afternoon, and I may say that they will receive attention and consideration by the Government. The resolutions are as follow:—1. Moved by Mr. Whitaker, and seconded by Mr. Gambling, "That, in the opinion of this Conference, a viticultural and horticultural station should be established to teach the theory and practice of the science of agriculture to students, to experiment in the propagation of new fruit (with which it would not pay private individuals to deal until their success in the country was assured), to attend to the nomenclature of species and varieties, to experiment in the exportation and preserving of fruits in syrup and by drying, to teach the practice and science of wine-making, and to cultivate and model Colonial seedlings." II. Moved by Mr. Stieme, and seconded by Mr. Stimson, "That the Phylloxera Bill be a separate measure from any other pest Bill." III. Moved by Mr. W. H. Suttor, M.L.C., seconded by Mr. Stieme, "That, in the opinion of this Conference, it is desirable that the Government should, as soon as possible, introduce a Bill to provide for the protection of the fruit-growing industry from all insect and animal pests."

Dr. FIASCHI said that before the delegates separated it was their duty to accord a vote of thanks to the Minister for the compliment he had paid them in presiding over the proceedings of the Conference. He had given them proof of his deep interest in the work of the new Department, and he had treated them with unvarying kindness and courtesy throughout the whole of their proceedings. It was with much pleasure that he made this proposition.

Mr. CAIRNES seconded the motion.

Mr. Relton heartily supported the previous speaker, and said that he had sufficient confidence in the Minister and his colleagues to be sure that the outcome of the Conference would be of inestimable benefit to the country.

The motion was put to the meeting, and carried with acclamation.

The PRESIDENT: I thank you, gentlemen, for the kindly manner in which you have recognised my services. I can assure you that it has afforded me great pleasure to preside over this Conference, and that pleasure is heightened by the knowledge that every delegate has been actuated by one desire—to assist the newly established Department of Agriculture. You have come forward in a noble spirit, and you have contributed information which will be of immense value, not only to the Department but to fruit-growers throughout the country and to those who contemplate embarking in the industry. I believe that you will agree with me that we have cause for mutual congratulation on the success of the first Conference on vine and fruit culture. I was deeply impressed with the importance of the subject and with the need for united and intelligent action in the many points of common interest. I therefore thought that you should have a voice in showing what line that

Digitized by Google

action should take. You have evidently agreed with me. You have responded loyally to my invitation. You have come from every fruit-growing centre of the colony. The best energy and intelligence of the industry has been represented here, as shown by the very able papers contributed, and the clear thoughtful discussion thereon. This country may be congratulated upon the possession of such men as those who have given us such valuable and unselfish help in our great investigation. We have had papers from gentlemen renowned in their own respective spheres—some for their scientific attainments, others for their practical knowledge and ability—and others for their own successful combination of theory and practice. It seems to me a very happy omen for our young country to see here men from the great countries of Europe, all combining together to form a great nation; all bringing together their collective experience to advance the interests of their adopted land. The ancient civilisation and culture of Italy have here an able exponent in Dr. Fiaschi, whose contributions to our discussions have given it a tone in every way admirable; the sturdy Teutonic race has been represented by men like Messrs. Stieme and Frauenfelder, whose courage, knowledge, and skill make them the stamp of colonists we so much value. France with its centuries of tradition in vine cultivation and wine making has been represented by such a genial and able son as Mr. Frere. Brave little Switzerland has its representative in Mr. Pulver, and the names of many others suggest the pleasing thought that our sunny land has drawn into one nationality many whose children are now as Australian in speech, character, and sympathies as the most patriotic can desire. Is it not a happy omen that our great national resources have been increased and developed by such worthy scions of the noble nations of Europe? This Conference has been happy in having such an able combination, and the results will, I believe, be seen in the improved state of our fruit-growing industries. I believe I am only echoing the sentiments of all the delegates when I return my best thanks to the gentlemen who did so much to make the Conference such a source of pleasure and profit to us all. The discussions have been conducted in a most happy manner—there has evidently been but one desire in all minds—to make the Conference a living success—to show the greatest sympathy to the new Department of Agriculture, to show fully the needs and wishes of the great industry you represent, and to give mutually all the benefit of the wisdom and experience gained by many years' past experimenting with little light, less encouragement and many difficulties. I believe this Conference will mark a new era in the history of your industry. I trust you have been convinced that one of the chief aims of my Department is to help those on the soil who, like yourselves, are doing their best to help themselves. Things cannot be done all at once, but I have every confidence that the many items of progress and improvement suggested by you will be noted and adopted, and that the foundations will be laid of a great and permanent national industry, one full of attractions to our sons, one that will be alike conducive to health of mind and body, and will rear up—the greatest pride of any great country—a virtuous and intelligent yeomanry settled on the soil. Whether I occupy the position of Minister of Agriculture for a long or a short period, I shall always watch with interest the progress of the industry and the work of the Department. I do not expect that this will be the last Conference; I hope that my successor will follow in the steps which I have taken, with regard to convening representatives of the vine and fruit growing industries in Conference. The present gathering has achieved much, and I believe future gatherings will do more, because of the experience which has

Digitized by Google

been gained here. In the inauguration of a Department of Agriculture the foundations have been laid of that which will prove of immense benefit to this country; and if the Department is judiciously administered, as I believe it will be from my knowledge of its officers, it will take high rank among the institutions of the country. As I have before said, we have a great country. We have varied soils and climate; we can grow almost every kind of fruit. All that is needed to enable us to succeed is perseverance and a knowledge of the best and most scientific methods of cultivation. With these I have no fear for the future of agriculture in New South Wales. As one who himself has engaged in the industry, and who has watched its development with increasing interest, I feel it a pleasure and an honour to be your first Minister. Although we are late in organising ourselves we have begun in earnest, and have the advantage of the experience of others to guide us. We are all anxious to assist each other, and to work together harmoniously, and this spirit of unity should permeate each colony equally, as only by this means can we hope to successfully combat and repel the incessant encroachments of pests. I thank you again for responding to my invitation. You have materially assisted us in a direction which will enable us to legislate on this great question. I cannot allow the Conference to close without expressing my gratification with the way in which the Conference has dealt with the subjects that have come before it, and without acknowledging the able assistance which has been afforded me by the Director of Agriculture (Mr. Anderson) and his officers.

A vote of thanks having been accorded to the Director on the motion of Mr. Whitaker, seconded by Mr. Stieme, the proceedings of the Conference terminated.

Digitized by Google

APPENDICES.

The Capabilities of certain Districts of the Colony for Fruit and Vine Cultivation: being collated information from that furnished by Orchardists and Vignerons.

Appendix A.

NORTHERN COAST DISTRICT.

Richmond River District.

Alstonville, Casino, Lismore, and Wollongbar.—Average annual rainfall, 48·36 inches; average annual temperature, 68·23 degrees; approximate range of temperature, from 25 to 116 degrees.

Fruit-growing is only in its infancy in this district, owing chiefly to the want of communication with the outside world. Fruits known as English fruits will not do well here, the winter being too mild, but both climate and soil are suitable for tropical and semi-tropical fruits.

Figs.—Very few grown.

Grapes.—Vineyards in their infancy; wine only made in a very limited quantity for private use; district unsuitable for drying. Varieties grown:—Black Hamburgh (Frankenthal), Isabella, White Muscat (Muscat of Frontignan), Reisling, and Sweetwater. Very little trouble from pests.

Peaches are not grown very extensively. The early varieties—flat China, early Newington, &c.—do best. A white grub is very troublesome, especially to late varieties.

Nectarines, pears, apples, and apricots.—Very few grown; climate not suitable.

Cherries and plums.—District unsuitable; winter too mild and short.

Oranges and lemons.—All varieties thrive well; large crops and splendid flavour. The land is ploughed, and seed sown, and afterwards the plants are thinned out. Very few are grafted, as grafted plants have a tendency to throw out suckers. Seville orange stocks are used. Trees are planted from 20 to 30 feet apart. The quincunx plan is found to be the best. Manures used:—Calcined vines, wood ashes, lime, thick mulchings of cane megass, blady grass, cornstalks, &c., are usually applied in rainy weather. Less pruning the better, except to clear away dead wood. Common lemons are attacked by a gall insect.

Pine-apples, bananas, custard apples, passion-fruit, guavas, mangoes, persimmons, loquats, Hovenia dulcis (Chinese raisin), Cape gooseberry, are all grown here.

Digitized by Google

Clarence River District.

GRAFTON.—Average annual rainfall, 44·76; average annual temperature, 68·7; approximate range of temperature, from 18 to 120 degrees; Height above sea level, 40 feet.

GRAPES are grown in small lots in all parts of this district. Oranges and bananas are grown in largest quantities. Peaches, passion-fruit, figs, and pomegranates come next in order of extent of cultivation. Orchards are small in this district. On account of the great destruction to fruit by flying-foxes people find it useless to plant the kind of fruit-trees which they attack.

Figs.—Varieties—Brown Turkey, Castle Kennedy, White Smyrna, Brunswick are propagated by cuttings and offshoots, and planted generally 18 feet apart; land generally ploughed or dug.

Peaches.—Flat China, Italian, and all the late varieties thrive well. Trees are propagated by means of grafting on seedlings, and are generally planted 20 feet apart. Land is ploughed or dug.

Grapes.—Table grapes:—Black Hamburgh, Black Prince, Isabella. For red wine:—Hermitage and Isabella. For white wine:—Reisling, Sweetwater, Verdeilho, and White Sherry (Pedro Ximenes). Land dug and subsoiled. Vines are grown from cuttings, and were planted 4 feet apart each way, but wider distances are now adopted.

Apricots.—Moorpark, Madeline, Peach Apricot, Elruge, Turkey, and Shipley's. Land is subsoiled and ploughed. Trees are planted 20 feet apart, and are grafted and budded on seedling peaches.

Oranges.—Siletta, Queen, St. Michael, and all varieties of mandarins. Land is subsoiled and ploughed. Seedlings thrive best and last the longest. Trees are planted 25 feet apart.

Soil.—Generally black alluvial, sandy clay, &c.

Manning River District.

WINGHAM, TAREE.—Average annual rainfall, 36·45 inches; average annual temperature, 67·2 degrees; approximate range of temperature, from 34 to 96 degrees.

EXCEPT in the case of vineyards, comparatively little judgment or care has been exercised in fruit culture. Although the soils vary and are generally very rich, yet fruit-trees have been planted without regard to suitable families or varieties, and have, in consequence, been very unsuccessful, especially as very little attention has been given to either grafting, pruning, or irrigating. The orchards are small, from 1 to 5 acres in extent. Grapes, oranges, and limes are considered most suitable for commercial purposes. Peaches, nectarines, apples, pears, figs, apricots, plums, persimmons, bananas, loquats, and blackberries are also grown with more or less success. Flying-foxes and parrots are a great check to the extension of fruit-growing in the district.

Plums.—Coe's Late Red, Greengage, and Orleans thrive best in this district.

Apples.—Winter Pearmain and Five Crown Pippin thrive best.

Pears.—Autumn Bergamot, China, Jargonelle.

Nectarines.—Scarlet Elruge, Weeping.

Peaches.—Royal George, Sustenance, June.

Oranges.—All kinds thrive well. The trees are usually planted in holes sufficiently large to contain the roots, the roots being first immersed in liquid manure.

Digitized by Google

Soils.—Rich deep loam, clayey subsoil; deep light loam; black loose soil, graduating into reddish clay at a good depth; broken stone.

Grapes.—The principal variety grown is the Black Hamburgh. Very little wine is made, and no grapes are dried. The land is ploughed, and cuttings planted 6 feet by 6 ft. Pruning is done in July. *Oïdium* and caterpillars are troublesome, and so also are birds.

Williams River.

Dungog.—Mean annual rainfall, 44·17 inches; mean annual temperature, 64·55 degrees; range of temperature, 34 to 101 degrees.

Grapes are grown in small quantities, and so also are peaches, nectarines, apricots, pears, figs, plums, apples, quinces, oranges, and lemons. Of these, oranges, grapes, peaches, nectarines, and apricots are considered most suitable for commercial purposes. This district appears to be well suited for the growth of all the fruits above mentioned (except, perhaps, apples, which do fairly well), but they are not grown in any quantity for sale, as there is no market, the absence of rail and water carriage making it quite impossible to get any of the fruits (oranges excepted) to market in a saleable condition.

Formation of surface soil and subsoil.—Some parts, strong loam; river flats, deep alluvial with clay and gravel subsoils.

Figs.—Land ploughed. Trees planted from 15 to 30 feet apart. The fruit is attacked, as well as the leaves, by brown beetles and caterpillars.

Peaches.—All varieties thrive well. Land is worked with the plough, and trees planted about 20 feet apart. In pruning keep trees dwarfed with open centre. Fruit in fourth year. Aphides and blister are troublesome. The remedy generally used for Aphis is syringing with weak kerosene emulsion.

Grapes.—Black Hamburgh. Very little wine made, nor are any grapes dried. Land ploughed and cuttings planted 6 feet by 6 feet. Pruning in July. *Oïdium* and caterpillars are troublesome; also birds.

Apricots.—The land is usually ploughed. The trees are planted from 20 to 30 feet apart. Apricots in this district are rarely troubled with pests, with the exception of flying-foxes and birds.

Nectarines.—Planted the same as apricots. Pruning is carried out in winter; the trees are dwarfed and the centre kept open. Aphis is very troublesome in this district, and syringing with weak kerosene emulsion is found to be a very effective remedy.

Oranges—Of all kinds thrive well. The land is ploughed. The trees are grafted on lemon stocks, and are planted 20 feet apart. Scale is very troublesome in this district.

Hunter River District.

Singleton, Allandale, and Branxton.—Average annual rainfall, 33·5 inches; mean annual temperature, 64·2 degrees; approximate range of temperature, from 24 degrees to 112 degrees; average height above sea level, 185 feet; from 135 at Singleton to 285 feet at Allandale.

Grapes are largely grown in this district, but other fruits, such as peaches, figs, nectarines, apples, loquats, apricots, plums, persimmons, and oranges do well here. This is generally a wine-growing district, and the ridges are nearly all very suitable for producing good wine. The soil varies very much, and is in some parts clayey and very stiff, being difficult to work when too wet. As this district is rather near the coast, the very heavy rains during vintage time often have a bad effect on the quality of the must, but on the average the wine produced here is as good as any other produced in the Colony. In nearly all cases the vines are staked, and trained on two wires.

Digitized by Google

Grapes.—Table varieties:—Black Hamburgh, Muscat Hamburgh, Black Prince, Golden Champion, Sweetwater, Muscat of Alexandria, Oporto, Liverdeen, Malaga. Red Wine:—Red Shiraz, Verdot, Pinot (Pineau), Lambruscat, Malbec. White Wine:—Reisling, Pineau, Verdeilho, Blanquette, Madeira, Chasselas, Shiraz (White Hermitage). For drying:—Muscat of Alexandria. The sandy soils are ploughed, and the stiff soils ploughed and subsoiled. Cuttings are usually planted. In the old vineyards the cuttings were planted 6 feet by 6, but now it is thought better to plant them further apart, usually from 8 by 8 to 9 by 13 feet, as vines have then a better chance to ripen the fruit in dry seasons.

Irrigation has never been tried in this district as yet, probably on account of the difficulty and expense of obtaining a sufficient supply of water; but there is every reason to believe that the results would be highly satisfactory (especially on the hill lands) if it could be carried out at a reasonable cost.

Manures used.—Superphosphate, bone-dust, lime, stable manure, sawdust saturated with ammonia-water from gas works, made into compost heaps, well mixed, and afterwards spread on and ploughed in immediately, has been found to be very effective.

Pruning.—In June and July the vine is cut back as far as practicable every year.

Pests.—Caterpillars, elephant beetles, grasshoppers, *oïdium*, and mealy bug.

Remedies.—Sulphur for *oïdium*.

Beneficial insects, &c.—Small brown beetle, small hawk, known locally as cuckoo, destroys the grubs, eats the caterpillars. Frilled lizard eats the grasshoppers and caterpillars.

Figs are not largely cultivated; the varieties that thrive best are Brown Turkey and White Genoa. The land is ploughed, and the trees are planted 20 feet apart. Stable manure is used principally. Very little pruning is needed. As a rule the trees commence fruiting after three years, and produce the largest crop at ten years. Beetles are the most troublesome pest; the remedy used is lime wash.

Peaches.—Nearly all kinds thrive well here, especially Royal George, Shanghai, and Red Italian. The land is ploughed; the trees are planted 20 feet apart, and worked on peach stocks. Very little manure is used, only an occasional mulching with decayed vegetable matter. In June and July the trees are pruned, the laterals are headed back, and the centre of the tree kept open. They commence fruiting at three years, give largest crops at about six or seven years, and bear profitably to fifteen years. Aphis is very troublesome; the remedy used is a solution of lime and sulphur sprayed over the trees. Fruit is picked when not quite ripe and carefully packed, care being taken not to bruise it.

Apricots thrive well in this district; the best varieties are Royal, Turkey, Kaisha, Orange, and Pennant Hills. The land is ploughed, and in some cases subsoiled; the trees are planted 20 feet apart, and are worked on peach or plum stocks. Stable manure ploughed in. Pests do not cause much trouble.

Nectarines do very well in this district, but are not very largely grown; the principal varieties are Weeping, Scarlet, and Stanwick.

Pears.—The principal varieties grown here are White Bergamot, Swan's Egg, China, Marie Louise, and Bell Pear. The land is ploughed, and, in some cases, subsoiled. The trees are planted 20 feet apart, and are worked on apple or pear stocks. They require but little pruning, merely thinning out superfluous wood; this is done in June and July. The trees commence bearing at five years, give largest crops at twenty years, and bear profitably to a

Digitized by Google

great age, probably eighty years. The trees are very rarely troubled with pests. The fruit is picked before it is quite ripe, and packed in sand or sawdust.

Oranges.—The varieties that thrive best are Parramatta, Alsop's Gem, St. Michael, Queen, and all varieties of Mandarins. The land is ploughed, and, in some cases, subsoiled. The trees are planted on the square system, 30 feet apart, and are worked on orange stocks. Forest leaves and decayed vegetable matter are the chief fertilisers applied on the surface in winter. The trees are pruned in August by merely thinning out the centre. Trees commence bearing at two years, give largest crops at fifteen years, and some trees are full-bearing fifty years old. The principal pests are scale and bark disease. Remedy used.—A mixture of 10 lb. of lime, 2 lb. of sulphur, and 1 lb. of sulphate of copper in 20 gallons of water. The fruit is picked before fully ripe, wrapped in paper, and tightly packed in cases for transit purposes.

Apples.—The principal varieties grown are Irish Peach, Red Caldwell, Ward's Seedling, Five Crown Pippin, Winter Pearmain, and Winter Majetin. The land is ploughed and sometimes subsoiled. The trees are worked on apple stocks (Winter Majetin and Northern Spy), and the planting is carried out on the square system, 20 feet apart. Stable manure is used; pruning is done in June or July; age of fruiting, three years; largest crops, fifteen years; age to which trees bear profitably, probably forty years. Woolly aphis is the most troublesome pest; the codlin moth has appeared in some parts, but not in large numbers; the remedies used are—lime, sulphur, and sulphate of copper for the aphis, and Paris green for codlin moth. The fruit is picked when not fully ripe, and stored in casks with alternate layers of bran. When required for market, it is packed carefully and firmly in cases.

Plums.—The varieties that thrive best are Black Damson, Australian Damson, Coe's Late Red, and Greengage. The land is ploughed, and, in some cases, subsoiled. The trees are planted on the square system, 20 feet apart, and are worked on peach or plum stocks. Stable manure is ploughed or forked in during the winter.

Surface soil.—Dark alluvial; subsoil, sandy loam to depth of 8 feet or more; chocolate marl on magnesian limestone; chiefly sand with clay and gravel subsoil; sandy loam, or rich black or chocolate soil with magnesian lime below; from stiff clay to light loam; subsoil generally porous.

Appendix B.

NORTHERN TABLE-LANDS.

Tamworth, Inverell, Uralla, Tenterfield, Armidale, and Glen Innes.—Mean annual rainfall, 28·34 inches; mean annual temperature, 61·87 degrees; approximate range of temperature, from 16 degrees to 120 degrees; average height above sea-level, 2,697 feet; from 1,271 feet at Tamworth to 3,511 feet at Glen Innes.

Grapes are only grown in small quantities, but all kinds of English fruits thrive very well. The principal fruits grown are apples, pears, cherries, plums, quinces, apricots, nectarines, peaches, walnuts, almonds, medlars, and oranges and grapes in some parts. Those considered most suitable for commercial purposes are apples, pears, cherries, plums, quinces, and walnuts. The vineyards, as a rule, are small, and there are very few of them; the largest is only 34 acres in extent. The orchards are of all sizes, from 5 acres to as large as 120 acres. The fruit industry is fast developing in this district; now that communication with Sydney is more easily obtained, large numbers of trees are being planted every season.

Digitized by Google

Figs are not largely grown, as many parts of this district are not warm enough for them. A few are grown at Tamworth, and appear to thrive well. The varieties are—Adam, Castle Kennedy, Singleton Perpetual, Early Violet, Large Blue, Small Blue, Hill's Brown, Green Ischia, White Genoa, and Black Genoa.

Cherries.—All varieties thrive remarkably well, except in the Tamworth district, where only a few varieties that are more suited for a warm climate are grown. The principal kinds are—Bigarreau, Early Purple, Guigne, Black Republican, Black Tartarian, Amber Heart, Black Eagle, Morello, Florence, Napoleon, Bedford Prolific, May Duke, Florence, Downton, The Duke, Aston, Black Heart, White Heart, Belle Agathe, Elton, Plancherry, Reine Hortense, and Governor Wood. The land is generally ploughed; in some cases subsoiled. The trees are propagated by either grafting or budding on their own stocks generally Bigarreau, Morello, and Kentish, and are planted from 20 to 25 feet apart. Very little manuring is done; sometimes farm-yard manure is spread on the ground and ploughed in during the winter, and occasionally a little bonedust is applied. It is found that cherries require little pruning, merely shaping the young trees and removing superfluous wood. The trees commence bearing about the third or fourth year, give largest crops from tenth to twelfth year, and bear profitably for upwards of twenty-five years. The worst enemy of the cherry is the "borer." The most successful remedies are plugging the holes with soap and syringing with turpentine. Green parrots and yellow-eyes are also very troublesome, destroying a large quantity of fruit. The fruit is picked before it is quite ripe, care being taken that it is quite dry and firm, and that faulty fruit is not put in with the good. It is then packed in small cases, known as quarter cases, holding from 15 to 20 lb., lined with paper.

Peaches.—All peaches thrive well. The principal varieties grown are as follows:—Royal George, Red and Yellow Italian, Shanghai, Yellow Mundi, Early Newington, Willis' Red June, Prince of Wales, Dr. Hogg, Early Crawford, Early Silver, Soudan, Salwey, Grosse Mignonne, Alexander, Admirable, and Noblesse. The land is usually ploughed. The trees are propagated either by grafting or budding on their own stocks, and are planted from 20 to 25 feet apart. Manures are rarely applied; mulchings of bush-rakings and vegetable refuse are occasionally given. Pruning is usually carried out during winter, though one orchardist recommends summer pruning. The leaders are thinned out and shortened, and all dead wood removed. The trees commence bearing in the third year, and give largest crops from seventh to twelfth. Black aphis is the most troublesome pest. The remedies generally used are: Soft soap and tobacco water, and a solution composed of a wine-glass full of kerosene, made into an emulsion with a bucket of milk and water, with a little tobacco water and 1 oz. of soft soap added, the trees to be sprayed three times with this mixture. The fruit is picked before it is quite ripe, and packed in bushel and half bushel cases.

Grapes thrive well only in the southern parts of this district. In the northern parts only a few hardy varieties are grown for table use, but in the neighbourhood of Tamworth considerable quantities are grown both for table use and for wine-making. The principal varieties grown are:—For table use—Black Hamburgh, Muscat Hamburgh, Golden Champion, Large White Chasselas, White Sherry, Isabella, Black Prince, Snow's Muscat Hambro, Catawba, and Golden Hamburgh. For red wine—Hermitage, Verdot, Malbec, Black Spanish, and Isabella. For white wine—Reisling, Shiraz, White Sherry, Verdeilho, and Chasselas. For drying—Muscat of Alexandria, Snow's Muscat.

Digitized by Google

Hambro, and Canon Hall Muscat. The land, as a rule, is ploughed deeply. Both cuttings and rooted plants succeed, some growers preferring one and some the other. For rooted vines the cuttings are planted in rows 6 inches apart, and planted out the following season. For the trellis vines, 8 ft. x 8 ft. apart is considered the best distance, and for staked vines, about 6 ft. x 6 ft. Little or no manure is applied. July and August are considered the best months for pruning; the leaders are cut back, leaving two eyes for staked vines, and left as far as practicable for trellis vines. *Oïdium* and caterpillars are both troublesome in most of the vineyards; sulphur for *oïdium*, and handpicking the caterpillars, are the only remedial measures adopted. The fruit is picked a few days before it is absolutely ripe, and is packed in small boxes containing about 28 lb. each.

Apricots.—All varieties thrive well; those mostly grown are—Moorpark, Late Warwick, Elruge, Red Rivers, Oullins' Early, Bennett's Moorpark, Early Orange, Camden Superb, Canino Grosso, Sardinian, Hemskerk, and Pennant Hills. The land is generally deeply ploughed. The trees are either budded or grafted on peach, apricot, plum, and cherry stocks, and are planted from 20 to 25 feet apart. Farm-yard manure, wood-ashes, and mulchings of bush rakings and vegetable refuse are the principal fertilisers used. The trees are pruned in winter, the leaders are cut back and thinned out; summer pruning is also recommended. The trees commencing bearing usually at from the third to fourth year give largest crops from eighth to tenth, and bear profitably to about fifteenth year. Apricots in this district are rarely troubled with any pests.

Pears.—All varieties thrive well, although one orchardist states that the Windsor is a complete failure at Armidale. The varieties chiefly grown are—Jargonelle, Bergamot, St. Germain, Marie Louise, Winter Nelis, Windsor, China, Brown Beurré, Bon Chrétien, and Napoleon. The land is generally ploughed deeply. The trees are grafted on their own stocks, and are planted from 20 to 25 feet apart. Mulchings of farm-yard manure and bush rakings are applied during the winter months, and afterwards ploughed in. The trees require but little pruning, merely shaping the young trees and cutting back the old ones. Root-pruning is found very successful when the trees are making too much wood, as it stops the vigour and causes the tree to form fruit spurs. Borer, leaf-blight, and fire-blight are the most troublesome pests. No cure is known for leaf-blight, for fire-blight the shoots are cut off below the blackened part and burnt. The fruit is picked before it is quite ripe, wrapped in soft paper, and carefully packed in small cases.

Apples.—All varieties thrive well, and are remarkable for size, colour, flavour, and good-keeping qualities. Those chiefly grown are—Northern Spy, Majetin, Five Crown Pippin, Maiden's Blush, Winter Pearmain, Cornish Gilliflower, Irish Peach, Devonshire Quarrenden, Scarlet Pearmain, Scott's Red Streak, Lord Nelson, Alexander, Nonpareil, Gravenstein, French Crab, Blenheim Orange, Mobbs' Royal, New England Pigeon, Shepherd's Perfection, and Rome Beauty. The land is usually ploughed deeply; the trees are grafted on their own stocks, Northern Spy, Winter Majetin, and Irish Peach, and are planted from 20 to 25 feet apart. Bonedust, lime, farm-yard manure, and mulchings of bush rakings are applied during the winter months. Pruning is carried out in June and July, the cross-branches are cut out, and all dead wood removed. Summer pruning is recommended by one orchardist. The trees commence bearing about the fourth or sixth year, give largest crops from tenth to fifteenth year, and bear profitably for upwards of thirty years. Woolly aphis, codlin moth, bark lice, and moss are

Digitized by Google

all troublesome pests in this district. The remedies used are, for woolly aphis, a solution composed of one part of sulphuric acid to ten of water, sprayed over the trees; for bark lice, lime-water; no remedy has been found yet for codlin moth, as it has only lately appeared in the district.

The fruit is carefully gathered, then put in layers about 1 foot deep, in a cool well-ventilated room and are looked over about once a week, all decayed fruits being removed. For market each apple is wrapped in paper, and carefully packed in cases.

Plums.—The varieties that thrive best in this district are—Diamond, Orleans, Greengage, Damson, Denniston's Superb, Magnum Bonum, Purple-gage, De Montfort Prolific, French Prune, and Prince of Wales. The land is ploughed deeply. The trees are worked on their own stocks, and are planted from 20 to 24 feet apart. Mulchings of farm-yard manure and bush rakings are applied during winter. Pruning is usually carried out during winter, when the young trees are cut back and shaped; but the old trees require very little pruning. The trees commence fruiting about the fourth year, yield largest crops at about ten years, and will bear profitably for many years, if properly looked after. The only pest that is at all troublesome is moss, and the remedy used is lime-wash. The fruit is usually picked, so that it will arrive at the market before fully ripe; if required for dessert purposes it is allowed to remain on the tree till it becomes quite soft.

Nectarines.—Nearly all varieties thrive well, except in the Tenterfield and Armidale Districts, where very few are grown. The principal kinds grown are Elruge, Stanwick, Newington, Weeping, Pitmaston Orange, Red Roman, and Albert Victor. The land is usually ploughed deeply. The trees are either grafted or budded on peach stocks, and are planted 20 to 25 feet apart. Mulchings of farm-yard manure and bush rakings are applied during the winter months. Very little pruning is required; usually the shoots are cut back and superfluous wood removed. Black Aphis is the most troublesome pest, and for this soft soap with tobacco water is generally used.

Oranges as a rule do not thrive well, except in the neighbourhood of Tamworth and Inverell, where the following varieties are grown:—St. Michael, Queen, Rio, Siletta, Teneriffe, Malta, Navel, and Emperor and Thorny Mandarins. The land is ploughed. The trees are grafted on lemon and orange stocks, and are planted from 20 to 30 feet apart. A top dressing of farm-yard manure is occasionally applied. Very little pruning is done. Red scale and mealy-bug are very troublesome, the remedy generally used for these being a solution of soft soap and kerosene sprayed over the trees.

Appendix C.

SOUTH COAST DISTRICT.

Hawkesbury and Brisbane Water District.

Gosford, Windsor, and Richmond.—Mean annual rainfall, 41·26 inches; mean annual temperature, 64·3 degrees; approximate range of temperature, from 21 degrees to 112 degrees; average height above sea level, 51 feet, from 33 feet at Gosford to 62 feet at Richmond.

There are a good many vineyards in this district, but most of them are very small. Orchards vary in size, from 1 to 50 acres. Oranges, lemons, grapes, peaches, apricots, apples, pears, figs, nectarines, plums, mulberries, persimmons, passion-fruit, walnuts, almonds, loquats, common banana, guavas, blackberries, raspberries, strawberries, quinces, and custard apples, and pine

Digitized by Google

apples in warm situations are also grown in this district. The most profitable are oranges, lemons, passion-fruit, peaches, apricots, nectarines, apples, pears, and grapes.

Oranges.—Siletta, Parramatta, Navel, and all varieties of Mandarin oranges thrive remarkably in this district; the soil is particularly suited for them, and in most cases the land is well sheltered. Some patches are trenched, others ploughed and subsoiled. In many of the old orchards small holes only were dug, and trees placed in. It has been found that the best plan in planting is the quincunx; trees being planted 20 to 30 feet apart. Manures used—Bone-dust, blood manure, lime, and compound commercial manures, surface soil, wood ashes, and mulches of seaweed, grass, &c., which are generally forked in round the trees. The trees are worked on both orange and lemon stocks, although in some cases lemon stocks are proving a failure. Very little pruning is done, disbudding summer growth is found to be the best method.

Oranges commence bearing at three years, and will bear to a great age, if well fed and healthy, especially where soil and shelter suit. Scale, smut, rust, lichen, borer, and black bug are all troublesome. Remedies.—Painting the stem and limbs with stiff clay, and syringing under and over the leaves with a thin mixture of clay and water on a dry westerly wind day has been found very effective for scale and other pests. Lime, sulphur, caustic potash, tobacco, soot, &c., are also used.

Grapes.—Table:—Black Hamburgh, Small White Chasselas of Fontainebleau, and large White of Moutauban, White Muscat of Alexandria, Isabella, Black Frontignan, Sweetwater. Red wine:—Merlot, Verdot, Mourvèdre, Sirrahs (Hermitage), Black Spanish, Sauvignon. White wine:—Marsanne, White Shiraz. For drying:—White Muscat of Alexandria. The land is generally ploughed, sometimes subsoiled and occasionally trenched. Cuttings are planted in nearly every case; the distance apart varies from 6 x 6 to 8 x 8.

Manures.—Bonedust, wood ashes, and lime are used.

Dr. Fiaschi, Tizzana Vineyard, Sackville Reach, Hawkesbury River, who has been very successful as a vine-grower, recommends the following system of manuring vines. Farm-yard and chemical manures applied, when the vines have attained their fifth year, as follows:—

First year: Farm-yard manure applied at the beginning of winter, scattered broadcast, and covered immediately.
Second year: No manure.
Third year: Chemical manure at the end of winter, scattered in the same way as above.
Fourth year: No manure.
Continue in the same order.

The chemical manure recommended has the following constituents:—

Nitrate of potash ...	...	2 cwt.
Superphosphate of lime	...	4 „
Sulphate of lime ...	...	3 „

} per acre.

Mr. Bonnard, Vitis Park, Richmond, recommends 1 ton of ashes, lime, and sand per acre once in five years.

Pruning is usually carried out in July or August. The methods adopted are as follows:—(1) The Cazenave long cane system for the Hermitage, Verdot, Black Hamburgh, Doradella; (2) a combination of the Medoc Y

Digitized by Google

system, with short spurs for the Black Spanish and White Shiraz; (3) and a method very much adopted known as the Gooseberry Bush. Rubbing off all useless shoots when in growth, shortening back bearing shoots when fruit is set, and spur pruning to two eyes of young wood in winter have been most successful.

Diseases and Pests.—*Oïdium* tuckeri, white grub, caterpillars, bud eater, peronospora, and numerous birds.

Remedies.—For *oïdium:* Where water is abundant, crushing the wine stalks at pruning time, and spraying leaves and fruit when the fruit is very young, with a solution of not less than 1 lb. of sulphate of potash to 100 gallons of water per acre. Where water is not plentiful, flowers of sulphur (not necessarily sublimate) should be liberally sprinkled not less than three times, and oftener, if necessary, every season, in the proportion of at least 1 cwt. of sulphur per acre. For peronospora the Bordeaux mixture of 6 lb. of sulphate of copper and 3 lb. of quick-lime in 20 gallons of water.

Winter ploughing, hoeing, and applications of lime to the soil, also burning fires on spring evenings, attract and destroy moths, &c.

Birdlime is used for destroying small birds.

The hornet has been seen killing and eating caterpillars.

Apples.—The best varieties in this district are Irish Peach, Lord Nelson, Cox's Orange Pippin, Blenheim Orange, Mobbs' Royal, Winter Pearmain, Trivett's Seedling, Adam's Pearmain, Five Crown Pippin, Nelson Codlin, Ribstone Pippin.

Some of the land is trenched, some ploughed and subsoiled. In the old orchards the trees have been planted in holes dug with the spade. The trees are grafted or budded on the Paradise stock, for dwarf trees, but the most reliable stock is the Majetin or the Northern Spy. The trees are also grafted on other blight-proof apples, and on the quince; root grafting is also carried out. The quincunx system is found to be the best; trees to be planted 20 to 25 feet apart.

Manuring is not carried out to any great extent. Bonedust, stable manure, and seaweed, applied when trees are resting, are very advantageous.

Pruning is carried out in winter. The best plan is to keep the trees open and train them to spread out. Disbudding is also adopted. The trees commence fruiting at about four years, largest crops at ten years and upwards, and will bear profitably for very many years if properly attended to.

Pests, &c.—Woolly blight, rust, borer, scale, codlin moth, and red spider in some parts are troublesome. Syringing with a thin mixture of clay, lime, and water is found to be the best method for checking most of these.

Apples should be picked dry, and care taken in packing that the fruit does not get bruised. For storage purposes, spreading them out thinly in a cool shed or packing in sand are found to be the best plans.

Apricots.—Best varieties—Moorpark, Kaisha, Early Orange, Hemskerk, Shipley's, Camden Superb.

The land is mostly ploughed, although in some cases subsoiling and trenching are carried out; the trees are planted 20 feet apart, and are worked on Muscle Plum, American Plum, Free Peach, and Apricot stocks.

Manures used are bonedust, dried blood, wood ashes, and surface soil dug in round the trees in spring. Apricots should not be pruned very much; heading back when young causes them to spread and keeps them from running up. Apricot trees commence fruiting in about four years, bear largest crops in about eight or ten years, and will bear profitably for many years if healthy. Pests are not very troublesome, although caterpillars sometimes attack the leaves.

Digitized by Google

Nectarines.—Best varieties are Albert Victor, Meek's Scarlet, Weeping, Pitmaston Orange, and Red Roman. The land is usually ploughed, although, in small orchards, trenching and subsoiling are adopted. Budding on peach or plum is found to be the best method of propagating. Neat whip grafting and, in the case of old trees, crown grafting are very good. Trees are planted 20 feet apart. Although manures are not very extensively used, bonedust, blood, and surface soil are most in favour.

Pruning.—Trees are pruned back and all superfluous shoots removed. In some orchards, rubbing out buds in spring is adopted. Trees commence fruiting in the third or fourth year, give largest crops from tenth to twentieth year, and will bear profitably for upwards of twenty years. Black aphis is the most troublesome pest; remedies for this are syringing with soapsuds, caustic potash, &c.

Peaches.—Best varieties—Briggs' Red May, Flat China, Royal George, Early Newington, Lord Palmerston, Italian Red, Italian Yellow, Shanghai, Early Albert, and Early Silver.

Land is, in some cases, ploughed, in other cases subsoiled, and in a few occasionally trenched. The trees are either grafted or budded on peach stock. American Muscle and Japanese Plums also answer well. The trees are planted from 20 to 25 feet apart. Dressings of bonedust, dried blood, wood ashes, and surface soil are found to prolong the life and vigour of peaches. Wood ashes are found to be especially effective from the quantity of potash they contain. The trees commence bearing in the third or fourth year, yield largest crop at from seven to ten years, and will continue bearing profitably for from twelve to fifteen years, if properly cared for. Black aphis is the most troublesome pest. Syringing with a mixture of soap, sulphur, tobacco, and lime is found to be the best remedy. Gum leaves boiled and mixed with water have been found effective. The fruit is picked by lifting, when it parts from the stalk. It is generally packed in common fruit-cases, with paper or fern leaves below and above the fruit, and round the sides. Half-cases are found to be the best. Fern packing and sorting out will be found well worth the trouble.

Pears.—Marie Louise, Windsor, Jargonelle, Bishop's Thumb, Winter Nelis, Duchess d'Angoulême, Catillac, &c., are the best varieties. Up to the present pears are not very largely grown in this district. North of Gosford they thrive very well indeed, and a good many trees have lately been planted there, but are not yet bearing. The land is ploughed, and, in some cases, subsoiled. The trees are generally planted from 20 to 30 feet apart, and are worked on both pear and quince stocks, but good pear stocks are found to be the best. Some varieties require pruning to shape them in winter, when the leaves have fallen, but most varieties will do best if allowed to grow with a leader, and to obtain full dimensions, by cutting out those shoots only that cross, get broken, or are decaying. Pears bear to a great age in this district. Some of the trees are forty years old, and quite healthy.

Plums.—The varieties that thrive here best are—Orleans, Diamond, Early Red, Victoria, Loutherborough, South American, and Mitchelson's. Plums are not grown to any extent in this district, only a few trees of the above kinds being grown amongst other fruit-trees, and not often in marketable quantities. Pruning.—Care must be taken to keep back the strong shoots, as the plum has a tendency to send up sky-scrapers or long water-shoots, which should be checked at once, and so encourage the formation of fruiting spurs. Plums commence bearing in the fourth or fifth year, give largest crops at seven years and upwards, and

Digitized by Google

will bear profitably to a great age if grown in deep soil. Pests are not very troublesome, the worst being scale and borer. Painting with clay and sulphur is found to be the best remedy.

Figs.—Brown and Green Ischia, Black Genoa, and other varieties are grown here. Dr. Fiaschi imported the White Adriatic (Dottati) from Italy, which he says thrives well, and is excellent in flavour when fresh, and also very good when dried. The trees are propagated either by cuttings, suckers, or layers, and are planted from 20 to 25 feet apart. The land is ploughed. Very little manure is used, but a good dressing of woodashes towards the end of winter is found to increase both quality and quantity of the fruit. Very little pruning is needed, but the trees should be kept clear in the middle, cross branches cut out, and suckers removed. Strong cuttings commence fruiting at two years old, but mostly it is the third or fourth year before they commence bearing figs, give largest crops from five years, and fruit to a great age. The most troublesome pests are the borer, a peculiar dark-brown beetle, and a worm called "soldier worm," which attacks the leaves and fruit buds. The best remedy for the borer is to pinch off and burn tips of shoots in which they are embedded. Drenching of caustic potash are also very effective. The best time for gathering the fruit is from December to February. Dr. Fiaschi says, "I prefer to pack them in baskets. First put a layer of fig-leaves, then a layer of figs, then a layer of fig-leaves, and so on until the basket is full. In baskets fresh figs keep better than in cases. This system can be used only when you have a contract with a fruit merchant, who will take care of the baskets and return them. For market purposes cases are preferred, as less expensive."

County of Cumberland.

CASTLE HILL, SEVEN HILLS, BLACKTOWN, LIVERPOOL, PENRITH, BAULKHAM HILLS, PARRAMATTA, GORDON, FAIRFIELD, THORNLEIGH, ROOTY HILL,—Mean annual rainfall, 40·68 inches; mean annual temperature, 64 degrees; approximate range of temperature, from 36 to 107 degrees; average height above sea-level, 174 feet—from 30 feet at Fairfield to 547 at Thornleigh.

THE principal fruits grown in this district are oranges, lemons, grapes, peaches, apricots, plums, pears, quinces, figs, persimmons, apples, loquats, nectarines, passion-fruit, Cape gooseberries, strawberries, &c. Of these oranges, lemons, grapes, peaches, apricots, apples, and pears are considered most suitable for commercial purposes.

The vineyards in this district are small as a rule; the orchards are of all sizes—from a few acres to a few hundred acres, some of them being the largest in the Colony.

Oranges.—The principal varieties grown are Parramatta, Siletta, St. Michael, Blood, Seville Queen, Rio Teneriffe, and St. Jago, Emperor, Canton, and Thorny Mandarins.

As a rule the land is ploughed; the trees are both grafted and budded on the common lemon and Seville orange stocks. The trees are planted usually from 18 to 25 feet apart. Bonedust sown broadcast in winter is the chief manure used, with occasional mulchings of bush rakings. In some cases chemical manures, such as superphosphate of lime, nitrate of potash, nitrate of soda, &c., are used. The best months for pruning are June, July, and August, when all the dead wood is removed, and the tree kept well open in the centre. Grafted and budded trees commence fruiting at about four

Digitized by Google

years, seedling from seven to ten years. Largest crops are obtained at from ten to fifteen years, and the trees bear profitably to a great age. Seedlings are supposed to bear very much longer than grafted or budded trees.

Pests, &c.—The principal pests are red and black scale, borer, elephant beetle, white louse, white coccus, and rust. The most successful remedy used is a solution of soap, sulphur, whale-oil, and kerosene, sprayed over the trees. The best time for gathering the fruit lasts from June till October.

Peaches.—All varieties thrive well; the principal sorts grown are Briggs' Red May, Early Newington, Royal George, Lord Palmerston, Princess Royal, Maltese, Early Crawford, Soudan, Flat China, Red and Yellow Italian, Early Silver, Shanghai, and Early Beatrice. The land is generally ploughed, and, in a few cases, subsoiled. The trees are generally grafted or budded on peach stocks grown from seed; in some cases plum stocks have been found to answer well; 20 feet apart is the usual distance for planting; bonedust is the chief manure used, harrowed or ploughed in during winter; superphosphate and nitrate of potash are also very successful.

Pruning is carried on during winter, and the branches are topped and thinned, and all ill-grown wood removed. The trees commence bearing about the third year, give the largest crops in about ten years, and if properly cared for will bear profitably for about thirty years. The principal pests are black aphis, yellows curl, and red spider. The remedy found most effective is a solution of soft soap and kerosene sprayed over the trees; sulphur, lime, and tobacco are also used. Flying-foxes are very troublesome, and do immense damage in this district. The fruit should be picked when quite dry and just before ripening; careful sorting and packing have always paid.

Grapes.—All kinds do well; the principal varieties grown are:—Table grapes—Black Hamburgh, Muscat Hamburgh, Black Prince, White Sherry, Royal Muscadine, Madresfield Court, Isabella, and Sweetwater. Red Wine—Reisling, Wantage, Hermitage, Burgundy (Black Pineau), Isabelia, Black Spanish. White Wine—White Sherry, Madeira, Schiraz, and Verdeilho. For drying—Bowood Muscat and Muscat of Alexandria. The land is ploughed and subsoiled, and in many cases trenched. Cuttings are mostly planted, as it is considered that they are cheaper, and less labour is required in planting; 6 x 6 feet apart is the distance generally adopted for planting, but when grown on trellis or wires more room is given. The quincunx system is recommended—7 ft. x 7 ft. apart—by some of the most successful vignerons. Bonedust is the chief manure used, although nitrate of potash and Pye's mixture are said to be very effective. Pruning is carried out in June and July, leaving sufficient spurs with two or three buds. *Oïdium* and caterpillars are the most troublesome pests; sulphur is the remedy used for *oïdium*, caterpillars are handpicked; elephant beetle and black spot are also troublesome in some parts. A friendly beetle has been seen killing and eating the caterpillars. The fruit is cut in dry weather, in the cool part of the day, and packed closely and carefully in boxes.

Figs.—All kinds do fairly well. The principal sorts grown are:—Black Turkey, Blue Provence, Brown Turkey, Brown Ischia, Brunswick, and White Marseilles. The land is ploughed and subsoiled, and in some few cases trenched. The trees are propagated from cuttings or suckers, and are planted about 20 feet apart. Of the very little manure used bone-dust and stable manure occupy most prominent places. Very little pruning is required, except removing the suckers and a few lower branches. Disbudding is found to be the best method. Some figs commence bearing in the second year, but three years is the general period. They bear largest crops in about ten years, and will bear profitably for upwards of thirty years.

Digitized by Google

The principal pests are brown beetle, red spider and scale. Solutions of soft soap, tobacco, and sulphur are the principal remedies. The figs are packed carefully in single rows in small boxes.

Apricots.—All varieties do well. The principal kinds grown are :—Moorpark, Camden, Hemskerk, Early Orange, Kaisha, early Pennant Hills, Mansfield seedlings, and Oullins' Early Peach. The land is ploughed, and in some cases subsoiled and drained. The trees are either budded or grafted on peach stocks, and are planted about 20 feet apart. Bonedust is the chief manure, put on broadcast and worked in. Chemical manures are also used by some. Pruning is mostly done in June and July. The vigorous shoots are cut back and dead wood removed. Pinching back shoots in summer is found to be the best plan, and this practice has superseded the use of the knife to a great extent. The trees commence fruiting in about the fourth year, give largest crops when ten years old, and, if healthy, will bear profitably for twenty years. The fruit is picked before it is quite ripe.

Nectarines.—All varieties do well. Those chiefly grown are :—Stanwick Elruge, Albert Victor, Pitmaston Orange, Red Roman, Meeks' Scarlet, Early Newington, Weeping, and Willis' Early. The land as a rule is ploughed. The trees are either grafted or budded on peach stocks, and are planted about 20 feet apart. Bonedust is the chief manure used, worked in during winter. The trees are pruned in winter; the vigorous shoots are cut back, and the tree kept open in the centre. They commence fruiting in about the fourth year; give largest crops at from eight to ten years, and bear profitably for twelve or fifteen years. Black aphis is the most troublesome pest. Kerosene emulsion and Gishurst compound are the remedies generally used. The fruit is picked when not quite ripe, and packed carefully in gin-cases or half-cases.

Apples.—Principal varieties grown are :—Trivett's Seedling, Irish Peach, Lord Nelson, Smith's Seedling, Frampton's Seedling, Winter Pearmain, Mobbs' Royal, Five Crown Pippin, Summer Pearmain, Kenyon's red, Sturmer Pippin, Royal Russet, and Pomme de Neige. The land is ploughed. The trees are either grafted or budded on Northern Spy and Majetin stocks, and are planted from 20 to 25 feet apart. Bonedust is the chief manure used, with an occasional mulching of bush rakings. Pruning is carried out in winter. The trees are kept well open; the head well balanced, and the tree kept compact, so as to shield the fruit from the effect of the sun and winds. The trees commence fruiting at about four years old; give largest crops at from ten to fifteen years, and will continue to bear profitably for thirty or forty years. American blight, codlin moth, and wireworm are the most troublesome pests. The remedies used are—for American blight, a mixture of soft soap and kerosene, sulphur and soap, and Gishurst compound; for the codlin moth, a band is placed round the trunk of the tree to trap the moths. The fruit is picked when half-ripe, and packed carefully in cases.

Pears.—All kinds of pears thrive well. The best varieties grown are:—Jargonelle, White Bergamot, Brown Bergamot, Beurré Bosc, China, Early Crawford, Williams' Bon Chrétien, Winter Nelis, Napoleon, Beurré Brown, Swan's Egg, Marie Louise, and Kissing Point. The land is generally ploughed, and in some cases subsoiled. The trees are either grafted or budded on their owns stocks, and are planted about 20 feet apart. Bonedust worked in the land during winter is the chief manure, but often none at all is used. The trees are pruned in winter; being strong growers, the shoots must be kept well cut back. Pears commence fruiting at about the fourth year; give largest crops from ten to twenty years, and will bear profitably to a great age. The most troublesome pests are American blight, codlin moth, and aphis;

Digitized by Google

the remedy generally used for American blight and aphis is a solution of soft-soap and sulphur; the codlin moths are entrapped in bags tied round the trees, and are then burnt. The fruit is picked when not quite ripe, and packed in single layers in cases.

Plums.—Nearly all varieties do well. The chief grown are:—Orleans, Diamond, Early Cluster, Loutherborough, Cherry, Tibbet's Wonder, Greengage, Angelina Burdett, Thompson's and Evans' Seedling. The land is ploughed, and in some cases subsoiled. The trees are either grafted or budded on their own stocks, or on peach stocks, and are planted from 16 to 20 feet apart. Bonedust and chemical manures are used, but only in small quantities. Occasionally a mulching of bush rakings is applied. The trees are pruned in June and July. The leading shoots are shortened back, and all dead wood removed. Pinching back the shoots in summer is also carried out with good effect. Plums commence fruiting in the fourth year; bear largest crops in about ten to twelve years, and bear profitably for upwards of twenty years. Red spider, aphis, and American blight are troublesome, but not to any great extent. The remedy used is a solution of soft soap, tobacco water, and sulphur.

Camden District.

CAMDEN AND BURRAWANG.—Average annual rainfall, 49·53 inches; average annual temperature, 64·5 degrees; approximate range of temperature, from 26 degrees to 111 degrees.

THE principal fruits grown are grapes, peaches, figs, apricots, nectarines, plums, apples, pears, cherries, and oranges in the Camden district; and apples, pears, plums, quinces, cherries, walnuts, gooseberries, currants, raspberries, and strawberries in the Berrima district. Both orchards and vineyards are small as a rule, although there is a large one at Camden Park, comprising from 80 to 100 acres, and another at Wild's Meadows, comprising 30 acres. From the latter some tons of cherries and plums are annually sent to Sydney and the northern ports of Queensland. Walnuts, chesnuts, hazelnuts, and filberts thrive exceedingly well. Tons of fruit in this district go to waste annually for want of a canning factory to absorb the surplus produce.

Figs are not very largely grown, the chief varieties are Green Ischia, White Ischia, Brown Provence, Blue Provence, Smyrna, and White Marseilles. Figs thrive well round Camden, but are very little grown in the Berrima district. The land is either ploughed or trenched. The trees are propagated from either suckers, cuttings, or layers, and are planted from 20 to 25 feet apart. Manures are very rarely applied. Pruning is scarcely ever resorted to, and only an occasional thinning out and cutting back of branches in winter is required. One of the worst enemies of the fig is a small beetle, which feeds upon the leaves and young fruit. No remedy is known, the only method used being hand-picking.

Cherries thrive well, and are grown largely in the Berrima district, but Camden is too warm, and not many are grown there. The varieties that thrive best are Boyer's Early Heart, Butner's Black Heart, Kirkland's Mammoth, May Duke, White Heart, Waterloo, Coronet, Bigarreau, Knights, and Early Black. Cherries are grafted on their own stocks. The land is ploughed and subsoiled; the trees are planted from 15 to 20 feet apart. Good farm-yard manure is found to be the best, and in some orchards bone-dust is used. The trees are pruned in winter; they are cut short back

Digitized by Google

to promote leafy growth, to protect from hot sun and dry heat. Cherries commence fruiting in about the fifth year, bear largest crops from the tenth to twentieth year, and, with proper cultivation, bear profitably to a great age. The most troublesome pests are borers and moths. The cherries are packed in wicker baskets, and layers of nettles are placed at the top and bottom to protect the fruit.

Plums.—All varieties do well here and fruit abundantly, especially the Jefferson, French Prune, Greengage, Coe's Golden Drop, and Black Damson. The land is ploughed, and in some orchards subsoiled. The trees are grafted or budded on their own stocks, and are planted from 15 to 25 feet apart. Pruning is carried out in winter, the long shoots being cut back and all dead wood removed; disbudding in spring is also practised. The trees commence bearing in from the third to the fifth year; give largest crops from seventh to fifteenth year, and bear profitably for upwards of twenty years. Pests are not very numerous, although in some parts red scale, borers and moth are very troublesome.

Grapes thrive well in the Camden district, but very few are grown around Berrima, the climate being too cold. The principal varieties grown are: For table use:—Black Hamburgh, Late Sherry, Muscat Hamburgh, Chasselas, Muscat of Alexandria. For red wine:—Hermitage and Black Muscatel. For white wine:—Reisling, Verdeilho, and White Muscat. For drying:—Muscat of Alexandria. The land is either ploughed and subsoiled, or trenched. The plants are propagated chiefly from cuttings, it being found that rooted plants get damaged more or less in transplanting. Should the season, however, prove dry, rooted plants are more likely to succeed. They are planted at various distances from 5 feet by 6 feet to 9 feet by 9 feet. Bone-dust, Sugar Company's manure, and farm-yard manure are the chief fertilisers, but they are not used to any extent, some vine-growers rarely using any at all. Pruning is carried out in winter, cutting back to two or three eyes is the plan generally adopted. *Oïdium* and phylloxera have both been troublesome in the Camden district. Sulphur is the remedy usually used for *oïdium*, and, for phylloxera eradication is the only safe remedy. The grapes are closely packed in shallow cases.

Peaches thrive well in this district, especially round Camden; all varieties do well, of which Royal George, Briggs' Red May, and Leopold are the best. The land is ploughed and subsoiled. The trees are either grafted or budded on peach stock, and are planted from 20 to 30 feet apart. Bonedust and farm-yard manure are the chief fertilisers with an occasional mulching of new soil. The trees are pruned during the winter months, the shortening back principle is generally adopted, it being found that neglect of this results in inferior fruit. Peaches commence fruiting in the third or fourth year, give largest crops from five years upwards, and, with proper cultivation will bear profitably for twenty years. Black aphis and "yellows" (Uromyces Amygdali) are very troublesome. Kerosene emulsion and a solution of soft soap and sulphur are found to be the best remedies. The fruit is picked before it is quite ripe and packed carefully in shallow cases.

Nectarines are grown in the same district as peaches and thrive equally well.

Pears.—All kinds thrive well; the principal varieties are Windsor, Jargonelle, Swan's Egg, Winter Nelis, Beurré d'Amanlis, Beurré Easter, Marie Louise, Chaumontel, Golden Beurré, and Gansel's Bergamot. The land is ploughed and subsoiled. The trees are either grafted or budded on their own stocks or on quinces, and are planted from 20 to 30 feet apart. The chief fertiliser is farm-yard manure. Pears are not pruned very much,

Digitized by Google

only a little thinning out during the winter months being required. They commence bearing in about the fifth year, give largest crops from tenth to twentieth years, and bear profitably for upwards of thirty years. Codlin moth, scale, and leaf blight are occasionally troublesome, but not to any extent. The fruit is picked before it is quite ripe. One orchardist recommends packing with corn husks.

Apples thrive very well; the best varieties grown are Winter Pearmain, Kentucky Redstreak, Russet, Five Crown Pippin, French Crab, Shepherd's, Rome Beauty, Nickajack, Ben Davis, Rhode Island Greening, Spitzemberg, Cox's Pippin, Maiden's Blush, and 'Xmas Kitchen. The land is either ploughed or ploughed and subsoiled. The trees are grafted on their own stocks, Northern Spy, Paradise, and Majetin being mostly used. One orchardist recommends the Norther Spy stock with Paradise grafted thereon 6 inches in length, and the intended fruit-tree grafted on the Paradise; the trees are then dwarfed and easily looked after. Standard sorts are planted from 20 to 30 feet apart, and dwarf 6 feet apart. Bonedust, Fison's, and farm-yard manure are the chief fertilisers forked in the winter. Pruning is carried out in winter; the trees are cut well back; the pyramid shape is the favourite; disbudding in spring is also adopted by some orchardists. The trees commence bearing in the third or fourth year, give largest crops from fifteenth to twentieth year, and bear profitably for upwards of thirty years. Woolly aphis, codlin moth, borers, and elephant beetles are very troublesome. For the first mentioned kerosene emulsion is the principal remedy. The fruit is picked when barely ripe, and carefully packed in medium-sized cases.

Oranges do not thrive well in this district except in a few sheltered positions near Camden; the varieties grown are Siletta, Navel, Parramatta, Seville, and Thorny and Emperor Mandarins. The trees are worked on lemon and Seville orange stocks, and a few seedling oranges are also grown. The trees are usually planted from 20 to 25 feet apart. Guano, bone-dust, and farm-yard manure are the chief fertilisers used. Pruning is carried out at the end of winter, dead wood and superfluous branches being removed. The trees commence bearing at about three years, give largest crops from tenth to twentieth year, and under favourable circumstances will yield profitably up to fifty years. Red and black scale are the most troublesome pests, but the trees can be kept free from them by good drainage and cleanliness, and by syringing with insecticides.

Apricots thrive well only in the Camden district. The varieties grown are Moorpark, Mansfield Seedling, and Camden Superb, &c. The land is ploughed and subsoiled; the trees are worked on peach stock and are planted from 20 to 30 feet apart. Bone-dust and farm-yard manure are the chief fertilisers used. The shoots are pruned back in winter and pinched out in spring. If this is not attended to the branches are liable to snap off—the branches of apricots being very brittle. The trees commence bearing about the third year, give largest crops from fifth to tenth year, and bear profitably for many years.

Shoalhaven District.

Mean annual rainfall, 40·91 inches; mean annual temperature, 59·6 degrees; approximate range of temperature, 23 degrees to 115 degrees.

The whole district is admirably adapted for fruit and vine growing, and for the making of light wines. Up to the present time very little has been done in either branches beyond growing for home consumption, but

Digitized by Google

there are indications that this district will shortly take its place as a fruit and wine producing centre. Several fruit and vine growers have of late been down from Sydney, and are of opinion that when the district is connected by railway with regular, cheap, and quick transit, hundreds of acres will be put under culture for producing fine light wines and table grapes.

Peaches thrive well here; the best varieties grown are—M'Arthur Slip-stone, Royal George, Yellow Italian, and Briggs' Red May. The land is either trenched or ploughed deeply. The trees are worked on their own stocks, and are planted about 20 feet apart. Wood ashes and bone-dust are the principal manures. Pruning is carried out in winter with, as a rule, pinching back in summer. The trees are kept as low as possible, and are not thinned out too much, so that the fruit may be protected from the sun. Scale and borer are troublesome. Soft-soap is the remedy generally used for scale.

Grapes grown here are Black Hamburgh, Royal Ascot, Reisling, and Shiraz. The land is ploughed, rooted cuttings are planted, and are trained on trellis work and wires.

Nectarines.—Very few grown, principally Stanwick, and an early white variety. The land is ploughed deeply, and in some orchards trenched. The trees are worked on peach stocks, and are planted 20 feet apart. Wood ashes and mulchings of leaves and litter are the principal manures. Summer pinching and winter pruning are practised. Scale and aphis are trouble-some. The remedies generally used are a wash of soft-soap, and spraying with kerosene emulsion, and dressing the stems and branches with lime and sulphur.

Pears thrive well here; principal varieties grown are—Winter Nelis, Beurré Bosc, and Crasanne, &c. The land is either trenched or deeply ploughed. The trees are worked on pear stocks, and are planted from 20 to 25 feet apart. Farm-yard manure, wood ashes, and mulchings of bush-leaves are the chief fertilisers used. Pruning is carried out in winter, the trees are thinned out, cross-branches removed, and the vigorous shoots topped.

Apples.—The principal varieties grown are—Rome Beauty, Golden Pippin, Hawthornden, Winter Pearmain, Lord Nelson. The land is either trenched or deeply ploughed. The trees are either grafted or budded on blight-proof apple stocks, and are planted from 20 to 25 feet apart. The fertilisers used are wood ashes, farm-yard manure, and mulchings of leaves and vegetable refuse. Pruning is carried out in winter, the vigorous shoots are shortened back to induce fruit spurs, cross-branches are cut out, and the trees kept as low as possible, thereby inducing a bushy habit and shelter from the sun. The most troublesome pest is American blight.

Apricots.—Very few grown; those growing thrive very well.

Plums.—Most varieties grow well, bearing immense crops. The principal are—Black Cluster, Angelina Burdett, Stuchburz Seedling, Mitchelson, and Black Damson. The land is either trenched or deeply ploughed. The trees are either budded or grafted on their own stocks, and are planted about 20 feet apart.

Oranges.—The principal varieties grown are St. Michael, Siletta, and Emperor, Canton, and Thorny Mandarins. The land is ploughed, and in some parts trenched. The trees are worked on lemon stocks, and are planted from 20 to 25 feet apart. Wood ashes and farm-yard manure, and occasional mulchings with bush-leaves are the principal fertilisers used.

Digitized by Google

Bombala District.

AVERAGE annual rainfall, 27·70 inches; mean annual temperature, 58·35 degrees; approximate range of temperature, 21 to 103 degrees; height above sea level, 3,000 feet.

GRAPES are grown, but not to perfection, owing to the cold weather. This district is well suited for all English fruits. Apples and pears are produced here, which, for quality, are equal to any in the Colony. The principal fruits grown are apples, pears, plums, gooseberries, raspberries, currants, cherries, nuts, and strawberries. For commercial purposes apples and pears are considered the most suitable. There are no vineyards. The orchards are small, the largest containing 500 trees.

Cherries.—The varieties that thrive best are—Bigarreau and White Heart. The land is trenched as a rule. The trees are worked upon wild cherry or on seedling stocks, and are planted about 20 feet apart. Stable manure and bone-dust are the chief fertilisers. They are dug in round the trees in winter. The trees are pruned in July, keeping them low, and allowing them to spread moderately.

Peaches only grow under shelter, such as a wall with northern aspect.

Pears thrive well here, the large baking pears attaining a phenomenal size.

Apples.—All varieties do well. Large crops of fruit are obtained of great size, fine flavour, and beautiful appearance.

Plums also thrive remarkably.

APPENDIX D.

SOUTHERN TABLE-LAND.

Northern Portion.

WELLINGTON, MUDGEE, BATHURST, ORANGE, PARKES, AND FORBES.—Mean annual rainfall, 25·7 inches; mean annual temperature, 59·15 degrees; approximate range of temperature, from 13 to 114 degrees; average height above sea-level, 1,657 feet; from 995 feet at Wellington to 2,891 feet at Orange.

THE principal fruits grown in these districts are grapes, peaches, nectarines, apricots, pears, apples, quinces, plums, figs, mulberries, medlars, almonds, cherries, blackberries, strawberries, gooseberries, currants, and nuts. Of these those considered most suitable for commercial purposes are grapes, apples, pears, plums, apricots, peaches, nectarines, cherries, quinces, raspberries, currants, and walnuts. The vineyards are small as a rule, ranging from 1 to 20 acres. Orchards are of all sizes, ranging from 1 to 50 acres.

Figs.—There are no fig orchards, but every orchard and garden has one or more trees, which thrive wonderfully well. Large Black Genoa and Brown Turkey are the favourite sorts. The land is ploughed and subsoiled, and in some cases trenched. The trees are propagated from cuttings and suckers, and are planted from 20 to 25 feet apart. Mulchings of stable manure are applied in autumn. Very little pruning is done, merely a little thinning out in winter is required. The fruit is generally wrapped carefully in leaves or paper, and packed in cases.

Cherries.—All kinds do exceedingly well and bear very profitably. The principal varieties grown are—White Heart, May Duke, Black Heart,

Digitized by Google

Bigarreau, Empress Eugenie, Morello, Black Eagle, Florence, Black Tartarian, Bigarreau Napoleon, and Plancherry. The land is ploughed, and in some cases trenched. The trees are usually worked on their own stocks, and are planted from 16 to 24 feet apart. Farm-yard manure is the principal fertiliser; it is dug or ploughed in during the winter months. Pruning is usually carried out in June and July. Vigorous shoots are cut back, and all superfluous wood removed. The trees commence bearing about the fourth year, give largest crops about twelve years, and bear profitably to a great age. The fruit is carefully picked, and packed in small shallow cases.

Peaches all thrive well in fair seasons. The principal varieties grown are Royal George, Yellow Italian, Early Newington, Shanghai, and Lord Palmerston. The land is usually deeply ploughed, and in some cases trenched. The trees are worked on their own stocks, and are planted from 20 to 25 feet apart. Farm-yard manure, dug or ploughed in during the winter months, is the usual fertiliser. Pruning is carried out in July, the shoots are cut back, and all cross-branches and dead wood removed. The trees commence bearing in the fourth year, give largest crops from tenth to twelfth year, and bear profitably for about eighteen to twenty years. Black aphis is very troublesome in all parts, and solutions of soft soap, tobacco and kerosene are the remedies applied.

Grapes all thrive well. Those varieties principally grown are:—For table use:—Black Hamburgh, Snow's Muscat Hamburgh, Muscat of Alexandria, Black Prince, Wantage, White Sherry, Sweetwater, Isabella, and Chasselas. For Red Wine:—Shiraz (Hermitage), Black Sherry, Black Spanish, Lambruscat, and Early Black Cluster. For white wine:—Verdeilho, Shiraz (White Hermitage), White Sherry, Reisling, and Madeira. For drying:—Muscat of Alexandria, Bowood Muscat, and Raisin des dames. The land is either trenched or deeply ploughed. Cuttings are more generally planted than rootlings, it being found that where a large area is to be planted the cost is considerably less, and if the season is at all favourable they strike easily, and as a rule make quite as much headway as the rooted vines. In many of the vineyards the cuttings have been planted 4 x 6 feet apart, but a distance of 8 feet by 8 feet apart is now generally adopted, even in some cases greater distances. Most of the vineyards have been planted in strong, rich soil, and it has not been found necessary to use any fertilisers so far. In the Bathurst district the Meat Preserving Co.'s fertiliser has been tried with great success, but it is difficult to procure. Pruning is carried out in July and August, the leaders being cut back, leaving two eyes. *Oïdium*, black spot, and caterpillars are the worst pests. Sulphur for the *oïdium*, and handpicking for caterpillars are the remedies used. For black spot no efficacious remedy has yet been used here. The fruit is tightly packed in cases lined with either paper or vine leaves, and holding about 30 lb. each.

Apples thrive remarkably well. The favourite varieties are as follows:—Irish Peach, Winter Pearmain, French Crab, Mobbs' Royal, Queen of Saltmarsh, Triumph of Emu, Lord Nelson, Five Crown Pippin, Carpenter's Nonsuch, and Caldwell's Keeper. The land is usually ploughed and subsoiled. The trees are usually worked on their own stocks, Northern Spy, Majetin and Irish Peach being the favourite and are planted from 20 to 30 feet apart. In some orchards no manure is used, but in others mulchings of farm-yard manure and vegetable refuse are applied with good effect. Pruning is usually carried out in July; the trees are kept as dwarfed as possible. The trees commence bearing in the fourth year, give largest crops from twelve to twenty years, and bear to a great age. There are trees in this district planted twenty-five years ago still bearing profitable crops. Woolly

Digitized by Google

blight is very troublesome in this district, and is doing great damage. Solutions of clay and sulphate of lime, tobacco water, and lime and sulphur are the remedies used. The fruit is picked when ripe, and laid out in a dry room on straw, and when wanted for market is wrapped in paper and packed in cases.

Pears.—The varieties that thrive best are Jargonelle, Windsor, Williams' Bon Chrétien, Napoleon, Marie Louise, Winter Nelis, Snowball, Gansel's Bergamot, Brown Beurré, and St. Germain. The land is generally ploughed and subsoiled. The trees are worked on their own or on quince stocks, and are planted from 20 to 30 feet apart.

Plums.—All do exceptionally well. The principal varieties grown are Orleans, Damson, French and German Prunes, Magnum Bonum, Coe's Golden Drop, Greengage, Purplegage, and Yellowgage. The land as a rule is deeply ploughed. The trees are grafted on their own or on peach stocks, and are planted from 18 to 25 feet apart. Very little fertiliser is used, farm-yard manure is occasionally dug in during the winter months. The trees commence bearing in the fourth or fifth year. Give largest crops from eighth to fifteenth year, and bear profitably for upwards of twenty years.

Nectarines.—The varieties that thrive best are as follows:—Elruge, Albert Victor, Stanwick, Newington, Hunt's Tawny, and Red Roman. The land is ploughed, and in some orchards subsoiled. The trees are worked on either peach or plum stocks, and are planted from 20 to 25 feet apart. Farm-yard manure applied during the winter months is the chief fertiliser. Pruning is usually carried out in July; the trees are kept low and carefully thinned out; they commence bearing in about the fifth year, and give largest crops from eighth to twelfth year, and bear profitably for about fifteen years. Black aphis is the most troublesome pest, and for this a solution of milk and kerosene is found to be the most effective remedy. The fruit is picked when barely ripe, and packed in cases with either paper or leaves.

Apricots.—All kinds thrive well; the varieties mostly grown are: Early and Late Moorpark, Royal, Camden Park, Turkey, Orange, and Late Warwick. The land is ploughed, and in some orchards subsoiled. The trees are worked on either apricot, peach, or plum stocks, and are planted from 20 to 25 feet apart. Farm-yard manure is the chief fertiliser used; this is dug in during the winter months. Pruning is carried out during the autumn. The trees commence bearing about the fourth year, give largest crops from the eighth to the twelfth year, and bear profitably for from fifteen to twenty years. Apricots are not often troubled with pests in this district.

Oranges do not thrive well in the colder parts of this district, especially round Orange and Bathurst, but only do fairly well at Mudgee, Forbes, Parkes, and Wellington. The varieties that thrive best are as follows: Navel, Parramatta, Siletta, St. Michael, Teneriffe, Kissing Point, Queen, and all varieties of Mandarins. The land as a rule is deeply worked. The trees are worked on their own or on lemon stocks, and in some orchards a few seedlings have been planted, and are very successful; they are planted from 16 to 20 feet apart. Farm-yard manure is dug in during the winter months, and occasionally a dressing of air-slacked lime is given in early spring. Pruning is carried out either in autumn or early spring. The trees commence bearing in about the fifth year, give largest crops from tenth to fifteenth year, and bear profitably for upwards of twenty years. Scale is the most troublesome pest, and for this lime and Gishurst compound are the remedies generally used.

Digitized by Google

SOUTHERN TABLE LAND.

Middle Portion.

YASS, MARULAN, GOULBURN, CROOKWELL, MURRUMBURRAH, COOTAMUNDRA, AND YOUNG.—Mean annual rainfall, 25·97 inches; mean annual temperature, 59·40 inches; approximate range of temperature, from 13 degrees to 112 degrees; average height above sea-level, 1,609 feet; from 1,079 feet at Cootamundra to 2,129 feet at Goulburn.

THE principal fruits grown are grapes, apples, pears, peaches, nectarines, apricots, plums, cherries, figs, oranges, lemons, gooseberries, strawberries, currants, and quinces. Of these the following are considered most suitable for commercial purposes:—Grapes, apples, cherries, plums, peaches, and apricots.

The vineyards as a rule are small. Orchards are of all sizes, and some in the Goulburn district are very large. Fruit-growing is fast increasing in these districts, as it is found that nearly all parts are very suitable, both as regards soil and climate.

Figs are not largely grown, although in the districts of Young and Cootamundra they thrive very well.

Cherries.—The varieties that thrive best are Black Heart, White Heart, Downton, Morello, Florence, Early Twyford, Marguerite, May Duke, and Bigarreau. The land is ploughed, subsoiled, and, in some cases, trenched. The trees are propagated by grafting on their own and on plum stocks, and are planted from 16 to 30 feet apart. In many orchards no manure is used, but in others farm-yard manure is applied during winter. Pruning is carried out during June and July, and the cutting back of strong shoots and removing cross-branches is all that is required. The trees commence bearing about the fourth year, give largest crops from tenth to fifteenth year, and bear profitably for upwards of twenty years. The fruit is picked when not quite ripe, and carefully packed in small cases.

Apples.—All kinds thrive well, the varieties chiefly grown are—Five Crown Pippin, Irish Peach, Winter Pearmain, Russet, Downton Pippin, Northern Spy, Gloria Mundi, Peach Apple, Tasmanian Ribstone, Golden Pippin, Gravenstein, Maiden's Blush, New England Pigeon, Lord Nelson, Trivett's Seedling, Scott's Red Streak, Creasy's Seedling, and Winter Majetin. The land is ploughed, and in some orchards subsoiled. The trees are worked on their own stocks, Winter Majetin and Northern Spy being preferred; grafting below the ground has proved very successful in some cases. The trees are planted from 20 to 30 feet apart. Farm-yard manure is the chief fertiliser used, applied during the winter, and forked or ploughed in. Pruning is carried out in winter; for the first three years the trees are well pruned back, after which the crop of fruit prevents the trees making much wood, and except removing irregular shoots and cross-branches, but little pruning is necessary. The trees commence bearing from about the fourth to sixth year, give largest crops from twelfth year, and continue to bear profitably for upwards of twenty years. Codlin moth and woolly blight are the most troublesome pests, the remedies used are as follows:—For codlin moth: castor-oil and sulphur, made into a thick paste, and then thinned out to the consistency of paint with kerosene, and applied with a brush; also scraping the bark and painting the branches with a solution of lime, soot, sulphur, and soapsuds has been found very effective. For woolly

Digitized by Google

aphis: the affected parts are painted with a mixture of Stockholm tar and boiled oil, in equal parts; a mixture of kerosene, sulphur, and lime is also used. The fruit is picked when nearly ripe, and packed in cases with layers of straw.

Pears.—All kinds thrive well, the varieties mostly grown are—Autumn and White Bergamot, Jargonelle, Napoleon, Windsor, Winter Nelis, and Large Bell. The land is ploughed and sometimes subsoiled; in some orchards the land has been trenched round the trees, and the other portion ploughed and subsoiled. The trees are worked on their own, and on quince and apple stocks; they are planted from 20 to 30 feet apart. Farm-yard manure is dug in during the winter months. Pruning is carried out during June and July, the shoots are cut back to within 9 or 10 inches of the old wood, according to the strength of the tree. The trees commence bearing the fifth or sixth year, give largest crops from twelfth to fourteenth year, and bear profitably for upwards of twenty years. Pests have not been very troublesome as yet, although codlin moth and black spot have appeared in some parts. The fruit is carefully picked, when it parts easily from the branch, and is laid aside to ripen.

Peaches.—The Principal varieties grown are—Briggs' Red May, Early Newington, Royal George, Italian Red, Italian Yellow, Cannon's Monster, Magdala, Salwey, Camden Excellent, and Yellow Mundi. The land is ploughed, and in some cases subsoiled. The trees are worked on their own stocks, and are planted from 20 to 30 feet apart. Farm-yard manure is applied during the winter months. Pruning is carried out during June and July, the shoots are cut back, and the centre of the tree kept open. The trees commence bearing about the fourth or fifth year, gives largest crops from eighth to twelfth year, and bears profitably for from fifteen to eighteen years. Black aphis and red spider are the most troublesome pests, for which lime, soot, and sulphur are the remedies generally used. The fruit is picked before it is quite ripe, and packed carefully in shallow cases.

Nectarines.—Very few are grown; they do not do very well, and are very liable to attacks of black aphis, and curly leaf. Hunt's Tawny, Early Newington, Elruge, Stanwick, and Weeping are the varieties that thrive best.

Apricots.—Not very largely grown. The varieties that thrive best are—Moor-park, Elruge, Large Red Rivers, and Bush Peach. The land is ploughed deeply. The trees are either grafted or budded on peach or almond stocks, while seedlings in some orchards have proved very successful. The trees are planted from 20 to 25 feet apart. Farm-yard manure is ploughed or dug in during the winter months. Pruning is carried out in June, July, and August, the strong shoots are cut back to the centre of the tree, kept well open. The trees commence bearing on the fourth or fifth year; give largest crops from tenth to fifteenth year, and bear profitably for upwards of twenty years. Apricots are rarely troubled with pests. The fruit is picked before it is quite ripe, and firmly packed in small cases.

Plums.—All varieties do exceedingly well. The kinds mostly grown are—Black Orleans, Diamond, American Cherry Plum, Greengage, Purplegage, French Prune, Damson, Coe's Golden Drop, Egg Plum, Ickworth Imperatrice, and Reine Claude de Bavay. The land is generally ploughed, and sometimes subsoiled. The trees are grafted on their own stocks, and are planted from 20 to 30 feet apart. Very little manure is used, only an occasional dressing of farm-yard manure is given during the winter months. Pruning is carried out in June, July, and August. The shoots are well cut

Digitized by Google

back until the tree comes into bearing, after which little pruning is required. The trees commence bearing in about the fifth year, give largest crops from tenth to fifteenth year, and bear profitably for upwards of twenty years.

Grapes.—The table varieties are largely grown, but in most parts it is too cold for any but the hardy varieties, and very little wine is made. The kinds mostly grown are—Black Prince, Black Hamburgh, Wantage, Sweetwater, St. Peter's, Baxter's Sherry, Snow's Muscat Hamburgh, White Sherry, Royal Ascot, Isabella, Golden Champion, Hermitage, and Muscat of Alexandria. The land is ploughed and subsoiled or trenched. Both cuttings and rooted vines are used. 8 x 8 feet to 8 x 10 feet is the usual distance for planting. Scarcely any other fertiliser but farm-yard manure, dug in in winter, is applied. The vines are pruned in June and July. The shoots are cut back, leaving from two to four eyes. *Oïdium* and black spot are the most troublesome pests, for which sulphur is the only remedy generally applied. The fruit is picked when quite ripe, and tightly packed in cases, holding about 30 lb. each.

Oranges are only grown in very small quantities, a few trees being planted in warm situations. The varieties that thrive best are—Parramatta, St. Michael, Cluster, and Mandarin.

SOUTHERN TABLE-LAND.

(Southern Portion.)

QUEANBEYAN, TUMUT, TUMBERUMBAH, WAGGA WAGGA, AND ALBURY.—Mean annual rainfall, 32·19 inches; mean annual temperature, 59·3 degrees; approximate range of temperature, from 18 to 117 degrees; average height above sea-level, 1,028 feet.

THE principal fruits grown are—Grapes, peaches, apricots, nectarines, plums, cherries, apples, pears, figs, almonds, walnuts, gooseberries, strawberries, mulberries, currents, raspberries, and quinces and oranges in some parts. Of these the following are considered most suitable for commercial purposes—Grapes, apples, pears, plums, peaches, cherries, and gooseberries.

In most parts the vineyards are very small, excepting round Albury, where wine-making is carried on very extensively, about from 900 to 1,000 acres of vines being under cultivation. The vineyards there range from ½ an acre to as large as 160 acres.

The orchards, as a rule, are small, the largest being under 40 acres. Both soil and climate are well suited for fruit-growing, but cost of transit to market retards extensive cultivation.

Grapes.—The varieties that thrive best are—For table use: Black Hamburgh, Muscat Hamburgh, Baxter's Sherry, Ladies Finger, Muscat of Alexandria, Brown Muscat, Black Prince, Sweetwater, Tokay, Waltham Cross, Gros Colman, Crystal, Black St. Peter, Chasselas, Golden Hamburgh, and Jerusalem. For red wine: Black Shiraz, Malbec, Cabernet, Mataro, Burgundy, and Brown Muscatel. For white wine: Reisling, Verdeilho, Tokay, White Shiraz (White Hermitage), Aucarot, Early White Frontignan, and Chasselas. No grapes are grown for drying in this district. Muscat of Alexandria does not set well.

Most of the vineyards are trenched with the plough from 15 to 20 inches deep, and then holes made 18 inches across and 18 inches or 2 feet deep. Both cuttings and rooted vines are planted; cuttings, as a rule, are considered the cheapest, and require less labour in planting. They are planted

Digitized by Google

at various distances, from 4 ft. x 4 ft. to as much as 10 ft. x 10 ft. apart. In many orchards no manure at allis used; in others an occasional dressing of stable manure or bone-dust is applied. Pruning is carried out in June, July, and August; from four to six spurs are left on each vine, according to the strength of the vine, and from two to three eyes on each spur. *Oïdium* and birds are the most troublesome pests the vigneron has to contend with; the elephant beetle has also attacked some of the vineyards. For *oïdium* the remedy used is flowers of sulphur dusted over the vines. Lizards are very useful here in destroying many of the insects. The table grapes are packed in the following manner:—Paper is placed on the bottom and sides of the cases, the fruit is then placed in and well shaken down, paper is placed over them, and the lid fixed firmly down. In many of the smaller vineyards the grapes are allowed to become quite ripe, then packed into large hogsheads and sold to the various winemakers.

Apples.—The varieties that thrive best are Irish Peach, Nonsuch, Lord Nelson, Ribstone Pippin, Pearson's Plate, Cornish Gilliflower, Alexander, Blenheim Pippin, Scarlet Nonpareil, Devonshire Quarrenden, Rome Beauty, Winter Majetin, Winter Pearmain, Buncombe, Northern Spy, Cox's Pomona, New York Pippin, Five Crown Pippin, Golden Russet, Blenheim Orange, and Mobbs' Royal. The land is ploughed and sometimes subsoiled, and holes dug 18 inches deep by 4 feet in diameter. The trees are grafted on their own stocks. Northern Spy and Winter Majetin are the favourite varieties. They are planted from 20 to 30 feet apart. Very little manure is used, only occasional dressings of farm-yard manure; one orchardist states that he applied one bucket of fowl manure and two buckets of wood ashes to each tree with great success, some of the apples weighing from 24 to 28 ounces each, with which he obtained first prize at Tumberumba show. Pruning is carried out during June, July, and August; the shoots are cut back, the centre kept open, and all dead wood removed; it is found that apples, with the exception of a few varieties, bear the fruit on the wood that is two or more years old. When there are more than two or three fruit spurs on a little branch they should be cut off, and when there are a superfluous number of fruit buds they should be rubbed off, or the trees will be covered with blossom but there will be little fruit. The trees commence fruiting about the fourth or fifth year, give largest crops from tenth to twentieth year, and bear profitably for upwards of thirty years. Codlin moth, woolly blight, curculio, and fungus are the most troublesome pests. The remedies used are:—For codlin moth, bands of rags or sacking are tied round the trees and afterwards burned; for woolly blight, curculio, and fungus, solutions of kerosene, lime, and soft soap sprayed over the trees. The fruit is picked when not quite ripe, and stored in dark, cool rooms; when wanted for market it is wrapped in tissue paper and packed in cases lined with straw or other soft material.

Pears.—The varieties that thrive best are Jargonelle, Williams' Bon-Chrêtien, Marie Louise, White Bergamot, Brown Beurré, Windsor, Napoleon, Prince of Wales, Doyenné du Comice, Comte de Lamy, Duchess of Orleans, Crasanne, Passe Colmar, Catillac, and Large Flat Baking. The land, as a rule, is ploughed and subsoiled. The trees are worked on their own or on quince stocks. It is found that when they are worked on quince stocks they fruit much sooner than when worked on their own stocks, but the pear stock is the best as it forms a larger tree, lives longer, and will thrive in a drier situation. The trees are planted from 20 to 30 feet apart. Farm-yard manure applied during the winter months is the only fertiliser used. Pruning is carried out in June, July, and August; after shaping the tree

Digitized by Google

very little pruning is required, merely keeping the centre open and removing all dead wood. The trees commence bearing at about six years, give largest crops from twelve to twenty years, and bear profitably for upwards of thirty years. Black spot, borer, and lichen are the most troublesome pests. The remedies used are—lime-water for the lichen; for the borer the affected twigs are cut off and burned; no remedy is known for the black spot. The fruit is carefully picked out and stored in a dark, cool room; when wanted for market, the fruit is wrapped in paper and tightly packed in cases.

Peaches.—The varieties that thrive best are—Briggs' Red May, Early Beatrice, Stump the World, Canon's Monster, Royal George, Bellegarde, Yellow Italian, Early Silver, Early Newington, Shanghai, Walburton, Admirable, Crimson Galande, and Reine de Verger. The land is generally ploughed, and in some cases holes are dug for the trees, from 3 to 5 feet in diameter, and from 18 inches to 3 feet deep. The trees are worked on their own stocks, and are planted from 20 to 30 feet apart. Very little manure is used, an occasional dressing of farm-yard manure is given during the winter months. Pruning is carried out in June and July; all the small-wood that bore the previous year should be cut off, and a succession of young wood encouraged; summer pinching is also recommended. The trees commence bearing in the fourth year, give largest crops at from seven to fifteen years, and bear profitably for about twenty years. Aphis, black flies, curculio, fungus, and birds are all very troublesome pests, the aphis especially so; in some parts so bad is this pest that many orchardists have given up growing peaches. The remedies used are—For aphis, 4 oz. sugar of lead to 1 gal. of whitewash, applied warm, and a solution of tobacco water and soapsuds; for fungus, a washing with lime water is found very effective. Black fly is very troublesome in some parts, it eats out the bud, and otherwise damages the trees; no remedy has yet been found for this pest. The fruit is gathered when it is not quite ripe, and tightly packed in small cases.

Nectarines are not largely grown; the varieties that thrive best are—Elruge, Hunt's Tawny, Lord Napier, Albert Edward, Stanwick, Royal, Red Roman, Rivers' Orange, Napoleon, Balgowan, and Hardwicke. The land is ploughed, and in some orchards subsoiled. The trees are worked on their own and on peach and plum stocks, and are planted about 20 feet apart. Farm-yard manure is applied in winter. Pruning is carried out in June and July, the centre of the tree is kept well open, and all strong shoots cut back, always cutting above a double bud. The trees commence bearing about the seventh year, give largest crops from twelfth to fifteenth year, and bear profitably for about twenty years. Brown aphis is the most troublesome pest; a solution of 4 oz. of sugar of lead to 1 gal. of whitewash applied warm has been found very effective; tobacco water has also been used with good results.

Apricots—Nearly all kinds thrive well, but in some parts are very uncertain croppers; the varieties that do best are—Moorpark, Oullins' Early, Mansfield seedling, Turkey, Campbellfield Seedling, Orange, Shipley's, Royal, Grosse Pêche, and Rivers' Large Early. The land is ploughed, and in some orchards subsoiled. The trees are worked on their own or on peach stocks, and are planted about 20 feet apart. Manure is rarely applied. Pruning is carried out in June, July, and August; the branches are thinned by cutting the little shoots or branches clean off close to the branch, and the strong shoots are shortened back. Superfluous buds are rubbed off in spring. The trees commence bearing about the fourth year, give largest crops from

Digitized by Google

tenth to twentieth year, and bear profitably for upwards of thirty years. Aphis, caterpillar, flies, and birds are all very troublesome pests. Solutions of soft soap, tobacco, and sulphur are found to be the most effective remedies. One orchardist states that last year his apricots were attacked by swarms of flies, which bored through the skin and sucked the juice of the fruit. He destroyed them by means of spraying the trees with a solution of carbolic soap and tobacco.

Figs thrive remarkably well in the warm parts, but are not extensively grown. The principal varieties are—White Marseilles, Smyrna, and Brown Turkey. Some old trees at Tumut are bearing enormous crops.

Cherries.—All varieties thrive well, and bear excellent crops. The kinds mostly grown are—May Duke, Bigarreau, Goblin, Black Heart, White Heart, Waterloo, Black Eagle, Florence, Empress Eugenie, Archduke, Purple Gem, Ohio Beauty, St. Marguerite, Black Tartarian, and Morello. It is found that cherries succeed best in a sandy loam, or any other rich porous soil. The land is ploughed, subsoiled, and in some orchards trenched. The trees are propagated from their own suckers, roots, or seedling stocks. Grafting underground has been found very successful, as also layering and grafting on American plum stocks. The trees are planted from 20 to 30 feet apart. Shallow planting is recommended. Farm-yard manure is the principal fertiliser; it is applied during the winter or early spring. It is found that cherries should not be manured until they are in full bearing, and even then, if the soil is fairly rich, very little manure is required. The trees require little pruning, except thinning and topping the strong leading shoots to make the trees bushy. The stem should be shaded from the hot sun, or the bark is liable to crack and gum then exudes, after which the tree is never healthy. They commence bearing about the fourth year, give largest crops from tenth to sixteenth, and bear profitably for upwards of twenty years. Cherries are not troubled much with pests. Lichen on the bark is the worst. Lime water is the usual remedy applied. At Gundaroo the borer was very troublesome in some orchards. Birds also were doing great damage. The fruit is picked when not quite ripe and packed in ordinary fruit cases. Those with a partition are found to be the best.

Oranges are not grown to any extent, though they thrive very well in the neighbourhood of Albury. The principal varieties grown are—Parramatta, St. Michael, Siletta, Teneriffe, Navel, Acme, and Mandarin.

Plums.—All kinds thrive well. The varieties mostly grown are—Damson, Orleans, Diamond, Cherry Plum, Greengage, Purplegage, Coe's Golden Drop, Angelina Burdett, Jefferson, General Hand, Red and White Magnum Bonum, Goliath, and Washington. The land is ploughed and subsoiled, and in some orchards trenched. The trees are grafted on their own, American plum, peach, and apricot stocks. American plum and apricot are found to be the best, as they do not throw up suckers from the roots. The trees are planted from 20 to 30 feet apart. Farm-yard manure and bones are the principal fertilisers, applied as a mulch in spring, and dug in in autumn. Pruning is carried out from June to August. The strong shoots are cut back and superfluous wood removed; disbudding in spring is also recommended. The trees commence bearing about the fourth year, give largest crops from tenth to fifteenth year, and bear profitably for twenty years. Aphis, curculio, caterpillars, birds, and fungus are all very troublesome in these districts. Lime water is used for the fungus, and tobacco water and soft soap for the aphis. The fruit is picked when not quite ripe, and packed in small cases, holding from 20 to 30 lb.

Digitized by Google

Appendix E.

WESTERN DISTRICT.

Dubbo and Narromine Districts.

Dubbo and Narromine.—Mean annual rainfall, 25·96 inches; mean annual temperature, 62·1 degrees; approximate range of temperature, from 17 to 113 degrees; height above sea-level, 865 feet.

The fruits grown in this district are:—Grapes, figs, cherries, peaches, nectarines, apples, pears, apricots, plums, quinces, oranges, lemons, &c. As the district becomes settled, and its resources opened up by a rural population, other fruits will no doubt become as common and plentiful as those mentioned. The vineyards are small as a rule, although there are two or three good-sized ones, one being from 30 to 40 acres in extent. The orchards are small, ranging from 1 to 6 or 7 acres. Orchards and vineyards succeed best in this district on the alluvial flats, near the creeks and gullies, more especially on the deep loamy soils of the Macquarie River valley and its main tributaries. Irrigation has been tried with very good results.

Figs.—All varieties do remarkably well with ordinary care and attention. The land is generally ploughed. The trees are propagated from suckers, and are planted from 18 to 30 feet apart. The land is rich, and very little manure is used. No pruning is done, with the exception of removing suckers.

Oranges do very well, provided they have been protected from frost for the first three years, and bear remarkably well from seven years upwards. The surface soil varies in character from almost pure sand to rich volcanic mud and loose porous loams. The black volcanic soils very often rest upon a pipeclay subsoil, and the sandy soils on a cold impervious barren clay, sometimes, however, having a rich blend. The subsoils of the main valleys are generally a mixture, forming a rich volcanic clay, often of great depth, which, when trenched and cultivated, is richer in constituents favourable to plant and tree growth than the soil above it.

Deniliquin District.

Mean annual rainfall, 18·30 inches; mean annual temperature, 62·9 degrees; approximate range of temperature, from 18 to 121 degrees; height above sea-level, 320 feet.

Grapes and many other fruits grow luxuriantly when properly attended to. The principal fruits grown are peaches, apricots, apples, pears, plums, quinces, loquats, oranges, lemons, and grapes. The most suitable for commercial purposes are grapes, pears, peaches, apricots, apples, oranges, and lemons.

There are no vineyards here—the grapes being grown in the orchards in small quantities.

The orchards are small—the largest not exceeding 16 acres in area.

Fruit-growing is only carried out here on a small scale; the population is very small, and the nearest market (Hay), is 70 miles by road.

Apricots all do well here; the varieties grown are Moorpark, Hemskerk, Pineapple, and Early Peach. The land is ploughed; the trees are worked on plum stocks, and are planted about 16 feet apart. Pig manure is

Digitized by Google

the chief fertiliser ploughed in in winter. The trees are pruned in June or July; they are kept well open in the centre, all rank shoots are cut out, and the young shoots shortened back.

Nectarines.—The varieties that thrive best are—Stanwick, Elruge, Humboldt, and Hunt's Tawny.

Peaches.—All varieties do well here; the principal grown are Royal George, Briggs' Red May, Salwey, Alexander, and Early Newington. Land is ploughed; trees are planted from 16 to 20 feet apart. Pig manure is the chief fertiliser, spread over the ground in July, and ploughed in. The trees are pruned in June and July, the system adopted being as follows:—The centre of the tree is kept open and the branches made to spread out sufficiently to shade the roots; the rank and weak shoots are removed, and the bearing wood cut back to the third or fourth double bud. Peaches in this district commence bearing in the third year, give largest crops in the sixth year, and do not bear profitably for more than about twelve years. Black aphis is troublesome; the remedies generally used are Gishurst compound and tobacco and sulphur. The fruit is picked four or five days before it is ripe, and is packed in layers in common fruit cases, paper being placed between each layer. In this manner it is sent 70 miles by waggon over a rough bush road, and arrives at the market in first-class condition.

Grapes all do well here, especially on the sandy soils. The land is ploughed; cuttings are planted 6 ft. x 7 ft. apart for stakes; 8 ft. x 9 ft. for trellis. Two wires are used for the trellis—one wire 2 ft. from the ground, the other 1 ft. higher. Guano is the principal fertiliser, of which 5 cwt. to the acre is ploughed in in July. Pruning is carried out either in June or July, the laterals of table grapes on trellis are cut back to one strong eye, or two if the vine is weak. *Oïdium* has been very prevalent the last two or three years, especially in small gardens, where water has been freely used. Three dressings of sulphur and a little salt spread round each vine every alternate year has been found a very effective remedy. The fruit is cut when quite ripe (all damaged berries are removed), then packed very tightly, in fruit-cases, lined with double paper. In this manner grapes have been sent as far as Sydney, and arrived in very good condition.

Plums all do well here; the principal varieties grown are Greengage, Coe's Golden Drop, Early Orleans, River's Prolific, Bryanstone Gage, &c. The land is ploughed; the trees are worked on the muscle plum, and are planted 16 feet apart. Pig manure and wood ashes are spread over the soil in June or July, and ploughed in. The trees are pruned in July as follows: The centre is kept open, spurs are thinned out and shortened, all rank shoots are removed, the branches not allowed to crowd, and the trees kept low. Trees in this district commence fruiting at about four years, give largest crops at ten years, and bear profitably for about 15 years.

Apples.—A large variety are grown here, and the favourite sorts are—Reinette de Canada, Rome Beauty, Yorkshire Greening, Scarlet Nonpareil, Newtown Pippin, Ward's Seedling, and King of Pippins. The land is ploughed only; the trees are worked on the Northern Spy Stocks, and are planted from 16 ft. to 20 ft. apart. Pig manure, nitrate of soda, and lime are the chief fertilisers, applied in June or July. The trees are pruned in July as follows: The centre is kept open to a height of 8 ft., branches kept from crowding, and the spurs cut pretty short; but some varieties do not require pruning every season. Most of the varieties commence fruiting in the sixth year, and give largest crops at about the fifteenth or sixteenth year. Chloris yellows attacks the apple-trees very badly; no remedy is yet

Digitized by Google

known, and unless one is soon found apple-growing will be a thing of the past in this district.

Oranges all do well here. The principal varieties grown are Acme, Siletta, Rio, Queen, St. Michael, and Navel. The land is ploughed only. The trees are worked on lemon stocks, and are planted from 20 to 30 feet apart. The principal manures used are guano and sulphate of ammonia, applied when the trees are in bloom, and when the fruit is half-grown. The best time for pruning is in September or October, but only a little is done, simply thinning out the branches. Trees commence fruiting in the fifth year, and give largest crops at about the tenth year. Red scale is the most troublesome pest. Gishurst compound applied warm is the remedy used.

Pears.—The principal varieties grown are Winter Nelis, Williams' Bon-Chrétien, Marie Louise, Broompark, Jargonelle, Josephine de Malines. The land is ploughed only. The trees are worked on seedling pear and quince stocks. Those worked on the pear are planted 20 feet apart, and those on the quince 16 feet. Guano and wood ashes are ploughed in in July. The trees are pruned either in June or July. Those on the quince stocks are kept pyramid-shaped, and those on the pear—bush shaped. They commence fruiting at about seven years, and bear largest crops at about fourteen years. Black spot is the only troublesome pest.

Corowa District.

Mean annual rainfall, 20·91 inches.

Grapes are the principal fruit grown here, although large quantities of the following fruits are also grown:—Apples, pears, peaches, apricots, figs, nectarines, almonds, cherries, oranges, and plums. Those considered most suitable for commercial purposes are grapes, peaches, apricots, figs, and almonds.

The vineyards are of all sizes, ranging from 5 to 160 acres in extent. About 1,000 acres of vines are planted here, and several hundred acres more are being planted out.

The orchards as a rule are small.

Both soil and climate are well adapted for vine and fruit growing, but the great drawback is want of railway communication, Melbourne at present being the only market available.

Figs.—All varieties do well. Those principally grown are White Genoa and Brown Turkey. White figs are found to be the best, blue figs not being suitable for drying purposes. The land is either ploughed 10 inches deep or ploughed and subsoiled. The trees are propagated from rootlets and cuttings, and are planted from 20 to 30 feet apart. Farm-yard manure is applied as a mulching in spring. Little or no pruning is required. The trees commence bearing at three years, give largest crops at from ten to twelve years, and bear profitably to a great age. Red spider and a small white fly are the most troublesome pests. Kerosene emulsion and soft soap are the most effective remedies. The fruit is sun dried, and packed tightly in small boxes.

Peaches thrive well, the principal varieties grown are Royal George, Early Crawford, Haigh's Early Slipstone, Merchant Campbell, Kerr's Seedling, Lady Palmerston, and Comet. The land is ploughed and subsoiled. The trees are worked on peach and almond stocks, and are planted from 20 to 30 feet apart. Mulchings of farm-yard manure are applied in August and September. The trees are pruned in June and July, when they are trimmed carefully, the cross branches removed, and shoots cut back. They commence

Digitized by Google

bearing about the fourth year, give largest crops at eight years, and bear profitably for about fifteen years. Aphis, curl-blister, and a small white fly are troublesome; the last attacks the fruit when ripe and sucks the juice from it. Soft soap and tobacco water is used for aphis with good effect, and sulphur for curl-blister, but no remedy has yet been discovered for the fly.

Grapes.—The varieties which thrive best are as follows: For table use:—Black Prince, Chasselas, White Muscat, Muscat Hambro, Muscat of Alexandria, Pedro, and Silver Champion. For red wine:—Shiraz, Malbec, Brown Muscat, and Roussillon. For white wine:—Tokay, Pedro, White Hermitage, Baxter's Sherry, Reisling, Aucarot, and Verdeilho. For drying:—Muscat of Alexandria, Sultana, Xante Currant, White Muscat, Brown Muscat, and Baxter's Sherry. Very little manure is used, bone-dust, fowl manure, and wood ashes are the most successful of those tried; they are applied round the vines in August or September. Pruning is carried out in June or July; for ordinary wine grapes grown on stakes two buds are left on each spur; table grapes are grown as a rule on trellis. *Oïdium*, black spot, white fly, and grasshoppers are the most troublesome pests. Sulphur is generally used as a remedy for *oïdium*, but no remedy has yet been discovered for white fly.

Apricots.—All kinds do well in the sandy loam. The varieties that thrive best are: Moorpark, Oullins' Early, Campbellfield Seedling, Royal, and Mansfield Seedling. The land is either deeply ploughed, or ploughed and subsoiled. The trees are worked on seedling peach and mussel plum stocks, and are planted from 20 to 30 feet apart. Farm-yard manure is the only fertiliser used, applied as a mulching in August and September. Pruning is carried out in June and July; the head is well balanced, the shoots cut back, and all cross branches removed. The trees commence fruiting at five years, give largest crops at ten years, and bear profitably for twenty years. Aphis and red spider are the worst pests. Spraying with kerosene emulsion is found to be the best remedy.

Nectarines.—All varieties do well, especially Red Roman and Hunt's Tawny.

Pears.—The varieties that thrive best are Jargonelle, Williams' Bon Chrêtien, Vicar of Winkfield, Beurré de Capiaumont, and Peach Pear.

Apples.—The varieties that thrive best in this district are: Lemon Pippin, Lord Nelson, Devonshire Quarrenden, Cellini, Dougherty, Prince of Pippins, and Morgan's Seedling.

Plums.—All varieties do well; those usually grown are: Greengage, Coe's Golden Drop, Cherry Plum, Yellow Magnum, New Orleans, Damson, and Egg Plum.

Oranges.—The varieties that thrive best are Parramatta, Mandarin, and Blood.

Memo. by the Director of Agriculture.

These notes have been collated from the answers furnished by 200 of the largest fruit-growers of the Colony, in reply to a series of questions submitted to them. The information is in many cases valuable, chiefly for its negative character. It is interesting, for example, to note how many names of fruits are mentioned that are evidently local, but may possibly be well known under other names if they can once be compared and identified. How many, again, are purely Australian in name, and are mentioned in Australian nurserymen's catalogues, but find no place in the best standard works, though perhaps many of them are almost identical with well-known imported

Digitized by Google

varieties. Others, again, are mentioned in different districts under different names, as indicated by the nomenclature of English and American fruit manuals.

The whole of the information afforded points to the urgent necessity of getting the types for each district described, modelled, and where possible identified, so that the same fruit in all districts may be known by the same name, and local seedlings of approved merit may be admitted into the national collection and duly described as to qualities and suitable localities.

Herewith is appended a list of the chief standard names and synonyms (from Hogg and Downing) in the cases where most confusion exists.

Those names in *italics* are the standard ones.

Apples.

Cornish Gilliflower—July Flower.
Blenheim Orange—*Blenheim Pippin;* Woodstock Pippin; Northwick Pippin; Kempster's Pippin.
Nelson Codlin—Nelson's Codlin; Backhouse's Nelson; Nelson.
Summer Pearmain—Autumn Pearmain.
Irish Peach—Early Crofton.
Lord Nelson—*Kirke's Lord Nelson.*
Queen of Saltmarsh—*Queen* (introduced by Saltmarsh and Son).
Gloria Mundi—Baltimore; Belle Dubois; Glazenwood Gloria Mundi; Mammoth; Ox Apple; Monstrous Pippin.
Ben Davis—New York Pippin; Victoria Pippin; Baltimore Red Streak, &c.
Nickajack—Red Pippin; Mobbs' Winter Rose; Wonder, &c.

Apricots.

Oullins' Early Peach—Pêche Hatif d'Oullins.
Kaisha—De Syrie.
Shipley's—Blenheim.

Nectarines.

Elruge—Claremont; Oatlands; Oldenburg; Springrove; Anderson's; Peterborough; Temple.
Balgowan—Balgone.

Plums.

De Montfort Prolific—*De Montfort.*
Victoria—Alderton; Denyer's Victoria; Sharp's Emperor.
German Prune—Quetsche; Early Russian; German Quetsche; Leipzig; Lwetsche, &c.
Ickworth—*Ickworth Imperatrice*; Knight's No. 6.
Green Gage—Damas Vert; Reine Claude; Isleworth Green Gage; Abricot Vert, &c.
Purple Gage—Reine Claude Violette; Violet Gage.
Yellow Gage—Gonne's Green Gage; Little Queen Claude; Reine Claude Petite; Petit Damas Vert; White Gage.

Pears.

Bon Chrétiens—Winter Bon Chrétien; D'Angoise; Bon Chrétien d'Hiver; Bon Chrétien d'Auch; Bon Chrétien Tours; De St. Martin.
Williams' Bon Chrétien—Bartlett; De Lavault; Williams'.
Chaumontel—Besi de Chaumontel; Beurré de Chaumontel; Beurré d'Hiver; Guernsey Chaumontel; Grey Achan; Oxford Chaumontel; Winter Beurré.
Gansel's Bergamot—Bonne Rouge; Brocas Bergamot; Diamant; Gurle's Beurré; Ive's Bergamot; Staunton.
Napoleon—Beurré Autien; Bonaparte; Bon Chrétien Napoleon; Beurré Napoleon, &c.
Catillac—Bon Chrétien d'Amiens; Chartreuse; Grand Monarque; Monstreuse des Landes; Bell Pear; Pound Pear.
Bishop's Thumb—Bishop's Tongue.
Beurré D'Amanlis—D'Amanlis; Beurré d'Amalis; Delbart; Hubbard, &c.
Comte de Lamy—Beurré Quetelet; Beurré Curtet; Dingler.
Passe Colmar—Beurré d'Argenson; Cellite; Chapman's; Colmar Bonnet, &c.
Vicar of Winkfield—Belle Andrienne; Belle de Berri; Le Curé; Paternoster, &c.
Winter Nelis—Beurré de Malines; Colmar Nelis; Etourneau, &c.
Beurré Capiaumont—Aurore; Beurré Aurore; Capiaumont; Calebasse Vasse.

Digitized by Google

Grapes.

Wantage—*Lombardy;* Flame-coloured Tokay; Red Rhenish; Red Taurida.
Black Frontignan—Muscat Noir; Muscat Noir Ordinaire; Sir William Rowley's Black.
Black Muscat of Alexandria—Snow's Muscat Hamburgh; Muscat Hamburgh; Red Muscat of Alexandria. NOTE.—There seems to be a well-defined variety in New South Wales called Snow's Muscat.
Catawba—Arkansas; Catawba Tokay; Lebanon Seedling; Red Murrey; Singleton.
Schiras—Ciras; Scyras; Sirrah; Sirac; Shiraz; Hermitage, both black and white.
Chasselas de Fontainebleau—Chasselas; Royal Muscadine; Amber Muscadine; Muscadine; Queen Victoria; Golden Chasselas, &c.
Muscat of Alexandria—Bowood Muscat; Charlesworth Tokay; Alexandrian Frontignan, &c. NOTE.—Bowood Muscat is considered here a cross of the Cannon Hall and Muscat of Alexandria.
Gros Colman—Grosse Kölner; Gros Colmar; Grosse Blanc, &c.
Black St. Peter's—Alicante; Black Lisbon; Black Portugal; Black Spanish; Black Tokay, &c.
Carbinet Sauvignon—Sauvignon; Carbinet.
Pinot—Burgundy; Pineau.
Pedro Ximenes—Pedro; White Sherry.
Grenache—Roussillon.
Mataro—Mourvèdre.

Digitized by Google

Appendix F.

Birds useful to Agriculturists, Fruit-growers, and Farmers.

By Dr. E. P. RAMSAY, F.L.S., F.R.S.E., LL.D., &c.

No. in Dr. Ramsay's Tabular List, 1883.

Hawks.

Sp. 18. The Black-shouldered Kite. Elanus axillaris, *Latham.*
Sp. 19. The Letter-winged Kite. Elanus scriptus. *Gould.*
Sp. 20. The Crested Hawk. Baza subcristata, *Gould.*

Food.—Small reptiles, rats, mice, and large insects, such as the larvæ of moths, also on Mantises and Phasmas, &c. The kites often congregate in large numbers at dusk, and devour quantities of locusts (*Cicada*), grasshoppers, and moths, &c.

Owls.

No. 29. The New Holland Barn-Owl. Strix novæ Hollandiæ, *Steph.*
No. 30. The Dusky Barn-Owl. Strix tenebricosa, *Gould.*
No. 32. The Long-legged Grass-Owl. Strix candida, *Tickell.*
No. 33. The Delicate Barn-Owl. Strix flammea, L. var delicatular, *Gould.*

Food.—The Barn-Owls are among the most useful vermin destroyers, living chiefly on mice and rats.

No. 34. The Boobook Owl. Ninox boobook. *Latham.*
No. 37. The Small Spotted Owl. Ninox maculata, *Vig. & Horsf.*
No. 38. The Winking Owl. Ninox connivens, *Lath.*
No. 41. The Powerful Owl. Ninox strenua, *Gould.*

Food.—All the species of Ninox are night birds, coming out at dusk, and seldom seen in the daytime. They destroy numbers of mice, rats, and other small mammals. Ninox boobook is known as the "Morepork" or Boobook owl, from its call-note resembling the words from which it takes its name.

The Goatsuckers, Podargus, and Night-jars.

No. 45. The Owl-like Podargus.* Podargus strigoides, *Latham.*
No. 49. The Plumed Podargus. Podargus plumiferus, *Gould.*

Food.—The Podargi, or "Goatsuckers," as they are often erroneously called, feed on mice, frogs, centipedes (Scolopendræ and Heterostomæ), cockroaches, spiders, scorpions, also on moths, phasmas, and their larvæ.

No. 43. The Owlet Night-jar. Ægotheles novæ-Hollandiæ, *Latham.*
No. 54. The Spotted Night-jar. Eurostopodus guttatus, *Vig. & Horsf.*
No. 55. The white-throated Night-jar. Eurostopodus albigularis, *Vig. & H.*
No. 56. The Great-tailed Goatsucker. Caprimulgus macrurus, *Horsfield.*

Food.—The Night-jars and Goatsuckers feed on insects of various kinds, captured at dusk and during the night.

* Sometimes called the tawny-shouldered podargus, and erroneously "Goatsucker," "Morepork," &c.

Digitized by Google

No. in Dr. Ramsay's Tabular List, 1888.

Swallows and Martins.

No. 59. The Australian House Swallow, Welcome Swallow, &c. Hirundo neoxena, *Gould.*

Feeds exclusively on insects, frequents the farm and dwelling-houses and the cities during the breeding season.

No. 61. The Tree Swallow. Petrochelidon nigricans, *Vieillot.*

Frequents the cultivated lands. Breeds in the hollow branches of large trees. *Food.*—Exclusively insects.

No. 62. The Fairy Martin. Lagenoplastes ariel, *Gould.*

Common about the farmyards and cultivations generally. Builds flask or bottle-shaped nests of mud under the eaves of houses and barns, &c. *Food.*—Insects only.

No. 63. The White-breasted Swallow. Cheramœca leucosternum, *Gould.*

Makes its nest at the end of a tunnel which it burrows in the sand and banks like the English sand martin. *Food.*—Insects; this species is found only in the interior portion of New South Wales.

The Australian Bee-eater.

No. 65. The Australian Bee-eater. Merops ornatus, *Latham.*

The Bee-eaters burrow in sandy ground and sides of banks, sometimes congregating in great numbers, and lay four round white eggs in a chamber at the end of the tunnel. *Food.*—Insects and their larvæ.

The Australian Roller.

No. 66. The Australian Roller, or Dollar Bird. Eurystomus pacificus, *Latham.* *Food.*—Insects of all kinds and their larvæ.

Kingfishers.

No. 67. The Laughing Jackass, or Giant Kingfisher.—Dacelo gigas, *Bodd.* *Food.*—Small snakes and lizards, centipedes, crickets, &c.

No. 71. The common or Sacred Kingfisher.—Halcyon sanctus, *Vig. & Horsf.*

No. 74. Macleay's Kingfisher. Halcyon Macleayi, *Jard & Selby.* *Food.*—Insects and their larvæ, worms, &c.

The Wood Swallows.

No. 81. The sordid Wood-Swallow.—Artamus sordidus, *Lath.*

No. 82. The White-breasted Wood-Swallow.—Artamus leucogaster, *Valenc.*

No. 83. The Masked Wood-Swallow.—Artamus personatus, *Gould.*

No. 86. The Black-Faced Wood-Swallow.—Artamus melanops, *Gould.*

No. 88. The White-eyebrowed Wood-Swallow.—Artamus superciliosus, *Gould.*

The Diamond Bird.

No. 89. The Spotted Pardalote, or spotted Diamond bird.—Pardalotus punctatus.

All feed on insects and their larvæ. The Wood-Swallows assemble in flocks about the cultivated grounds and farm-houses, feeding on insects, grubs, spiders, &c., and nest in trees. The pardalotes (P. punctatus), burrow in the ground, in banks, &c., and obtain their food, consisting of insects, spiders, &c., among the leaves of trees.

Digitized by Google

No. in Dr. Ramsay's Tabular List, 1888.

Magpies, Thrushes, Jays, &c.

No. 105. The Magpie, or Piping Crow.—Gymnorhina tibicen, *Latham.*
A very ornamental and useful bird; feeds on insects of all kinds, and well known to all the settlers.

No. 106. The White-backed Magpie.—Gymnorhina leuconota, *Gould.*
Similar to the last in habits, &c.; found in the interior of N.S.W., and the southern parts of Australia generally.

No. 117. The Pied Grallina.—Grallina picata, *Latham.*
Known to the settlers as the "Derwent magpie," "Magpie-Lark," "Mud-lark, &c." It builds a bowl-shaped nest of mud, lined with grass, on the horizontal branches of trees, often overhanging the water. *Food.*—Insects and their larvæ. Crickets, worms, &c.

No. 118. The Black-faced Graucalus.—Graucalus melanops, *Latham.* Blue Jay of the settlers.

No. 119. The Black-throated Graucalus.—Graucalus mentalis, *Vig. & Horsf.* Smaller Blue Jay and Varied Jay of the colonists.

No. 123. The Ground Graucalus.—Pteropodocys phasianella, *Gould.* The Long-tailed Jay and Ground Jay of the settlers.
Food.—The larger insects and their larvæ, Phasma, &c., &c.

All the Jays frequent the leafy branches of trees and also cultivated grounds; and in the winter may be met with in the orchards and gardens.

No. 126. The Tricolored Campephaga.—Lalage tricolor, *Swainson.*
Known to the settlers as the small Magpie lark. They feed on grubs of all kinds, and insects generally found about all the open grounds, farms, and gardens.

No. 140. The Harmonious Thrush.—Collyriocincla harmonica, *Lath.*
The song thrush frequents the wooded districts and occasionally the gardens and shrubberies, sings well, feeds on worms and insects and their larvæ in general.

Flycatchers.

No. 155. The White-shafted Fantailed Flycatcher, Fantail.—Rhipidura albiscapa, *Gould.*

No. 153. The Rufous-fronted Fantailed Flycatcher, Rufous Fantail—Rhipidura rufifrons, *Latham.*

No. 161. The Water Wagtail.—Sauloprocta motacilloides, *Vig. & H.* Water wagtail, Shepherd's Companion, Black Fantail, &c., of the settlers.

No. 163. The Restless Flycatcher.—Seisura inquieta, *Latham.* Razor-grinder, Land Wagtail, &c.

No. 164. The Smaller Restless Flycatcher.—Seisura nana, *Gould.*
This species inhabits the interior portions of the Colonies; habits and food same as preceding.

No. 171. The Brown Flycatcher.—Micræca fascinans, *Latham.* Tit-lark, Jacky-winter, Brown Stumper, &c., of the settlers.

No. 180. The White-throated Gerygone.—Gerygone albigularis, *Gould.* Native canary, &c., of the settlers.
Food.—Of all exclusively insects, Flies, Gnats, &c.

Digitized by Google

No. in Dr. Ramsay's Tabular List, 1888.

Flycatchers, Robins, Wrens, &c.

No. 192. The Rose-breasted Robin.—Erythrodryas rosea, *Gould.*

No. 194. The Red-breasted Robin.—Petraæca leggii, *Sharpe.* Petroica multicolor, of Gould's Birds of Australia.

No. 195. The Red-capped Robin.—Petræca goodenovii, *Vig. & Horsfield.*

No. 197. The Flame-breasted Robin.—Petræca phoenicea, *Gould.* Orange-breasted Robin of the settlers.

No. 198. The Pied or Black and White Robin.—Melanodryas bicolor, *Vig. & Horsf.*

No. 206. The Yellow-breasted Robin.—Eopsaltria australis, *Latham.*

Food.—Insects and their larvæ, worms, spiders, &c.

Australian Wrens.

No. 220. The Blue Wren or Superb Warbler.—Malurus cyaneus. *Latham.*
No. 222. Lambert's Wren.—Malurus lamberti, *Vig. & Horsf.*
No. 232. The Black-headed Wren.—Malurus melanocephalus, *Vig. & Horsf.*

Food.—Exclusively insects and their larvæ, spiders, &c.

Grass Warblers, Larks, Reed-birds, &c., &c.

No. 240. The Emu Wren.—Slipiturus malachurus, *Latham.*
No. 252. The Rufous-headed Grass Warbler.—Cisticola ruficeps, *Gould.*
No. 256. The White-fronted Sericornis.—Sericornis frontalis.
No. 262. The Little Brown Acanthiza.—Acanthiza pusilla, *Latham.*
No. 268. The Yellow Acanthiza nana.—*Vig. & Horsf.*
No. 269. The Striated or Lineated Acanthiza.—Acanthiza lineata, *Gould.*
No. 270. The Wren-like Geobasileus.—Geobasileus reguloides, *Vig. & Horsf.*
No. 271. The Yellow-rumped Geobasileus.—Geobasileus chrysorrhæa. *Q. et Gaim.*
No. 272. The Tricolored Ephthianura.—Ephthianura tricolor, *Gould.*
No. 273. The Yellow-fronted Ephthianura.—Ephthianura aurifrons, *Gould.*
No. 274. The White-fronted Ephthianura.—Ephthianura albifrons. *Jard. & Selb.*
No. 276. The White-faced Xerophila.—Xerophila leucopsis, *Gould.*

Food.—Insects, spiders; chiefly flies, gnats, and their larvæ.

No. 282. The Speckled Ground-lark.—Chthonicola sagittata, *Latham.*
No. 283. The Australian Pipit or Common Lark.—Anthus australis, *Vig. & Horsf.*
No. 284. The Skylark.—Cincloramphus cruralis, *Vig. & Horsf.*
No. 286. The Rufescent Skylark, Bush-lark, &c.—Cinclorampus rufescens, *Vig. & Horsf.*
No. 289. The Reed-warbler.—Calamoherpe australis, *Gould.*
No. 292. Horsfield's Thick-billed Lark.—Mirafra horsfieldii, *Gould.*

Food.—Insects of all orders, caterpillars, &c.

Digitized by Google

No. in Dr. Ramsay's Tabular List, 1888.

Organ-bird, Struthidea, Pomatostomi.

No. 347. The Organ Bird or White-winged Corcorax.—Corcorax melanorhamphus, *Vicill.*

Food.—The larger insects, caterpillars, &c., obtained on the ground.

No. 348. The Grey Struthidea.—Struthidea cinerea, *Gould.*

No. 352. The Temporal-pomatostomus.—Pomatostomus temporalis, *Vig. & Horsf.*

No. 353. Pomatostomus superciliosus, *V. & H.* The white eye-browed Pomatostomus.

Food.—Insects generally and their larvæ.

Tree-creepers, &c.

No. 438. The Tree-creeper.—Climacteris scandens.

No. 440. The Red-eyebrowed Tree-Creeper.—Climacteris erythrops, *Gould.*

No. 443. The White-throated Tree-Creeper.—Climacteris cucoptræa, *Latham.*

No. 446. The Orange-winged Nut-Hatch.—Sittella chrysoptera, *Latham.*

Food.—Insects and their larvæ from the stems of trees and decaying logs, &c.

Cuckoos, &c.

No. 453. The Pallid Cuckoo, or Grasshopper Hawk, &c.—Cuculus pallidus, *Latham.*

No. 453. The Fan-tailed Cuckoo.—Cuculus flabelliformis, *Lath.*

No. 459. The Bronze Cuckoo.—Chalcites plagossus, *Lath.*

No. 461. The Thin-billed Bronze Cuckoo.—Chalcites basalis, *Horsf.*

No. 461. The Channel-bill.—Scythrops novæ-hollandiæ, *Lath.*

Food.—Insects of all kinds, spiders, caterpillars, &c.

Rails, &c.

No. 650. The Common Rail, Water Rail, &c.—Rallus pectoralis.

No. 651. Lewin's Rail.—Rallus brachypus, *Swains.*

Food.—Snails and worms in the gardens and among the long grass in orchards, wheat-fields, &c.

The above-mentioned 89 birds are those usually found in and about the farms, gardens, orchards, &c., in this Colony. They are all insect-eaters, most of them exclusively so, and should be protected. A few, which destroy insects in the winter months, but also eat fruit, have been omitted.

Digitized by Google

Appendix G.

Australian Birds; Useful and Noxious.

By The Honorable JAMES NORTON, M.L.C.

The information intended to be here given, with respect to the habits and the good and bad qualities of Australian birds, so far as they affect the agriculturist and the horticulturist, is the result of many years' observation and practical experience.

As a general rule, insectivorous birds are supposed to be the friends and helpers of man; but the fact must not be overlooked, that many insects, particularly the mantis, are great destroyers of other insects injurious to man, and that many of the larger birds, in preying on these useful insects, thereby do quite as much harm as they do good by the destruction of injurious insects.

Moreover, I am convinced that on the whole birds are much more injurious than insects, and that it is much easier to guard against the ravages of the latter than of the former, for nothing will protect the cultivator against birds but the expensive process of constantly shooting them or driving them away, or the equally expensive system of netting, while the damage done by many insects may be guarded against by various, and much less expensive, chemical and other processes.

It must not be overlooked that insectivorous birds trouble themselves only about such insects as suit their own tastes, and often entirely neglect those which we know or think to be injurious. There are many birds, for instance, which devour the useful mantis, and very few which attack caterpillars and snails.

I have arranged the birds in the order in which they appear in Gould's Handbook, to which the numbers affixed refer; but I have taken the scientific names from Dr. Ramsay's carefully prepared tabular list, published in 1888, which not unfrequently differs from the Handbook, as well as from Gould's splendid folio work now entirely out of print. The Handbook contains a careful description of each bird and its habits, while Dr. Ramsay's work, though very useful, does not profess to be more than a catalogue giving the distribution and the nomenclature as now settled by the highest authorities.

I have not thought it necessary, even if I were capable, to deal with all the birds of the Colony, numbering 450; and I have therefore confined myself entirely to those which, as far as my experience goes, interfere beneficially or otherwise with the pursuits of man, and I have generally omitted those which, although mischievous or otherwise, are neither common nor numerous enough to do any damage or benefit worth mentioning.

I do not pretend that the list is perfect, but it is at all events a commencement, and may encourage others better acquainted with the subject than myself, to fill up gaps and make such corrections as may be found necessary.

It will be seen that I have availed myself largely of the labours of Mr. Gould, and it is only right to acknowledge that I have received valuable assistance from that other eminent Australian ornithologist, Dr. Ramsay, Curator of the Australian Museum, of which I have had the honour to be a trustee for the last sixteen years.

Digitized by Google

Eagle.

1. *Aquila audax.*

The natural food of this grand bird consisted, up to the advent of the white man, of the smaller kinds and young of the kangaroo tribe, and of large birds, such as the bustard or plains turkey, and also of carrion; but, apparently, civilization has somewhat demoralised it, for, since the introduction of sheep, it has been considered a formidable foe to the settler, as it often carries off his lambs. It, however, endeavours to compensate for the mischief thus done by preying on rabbits, though the benefit done in that way cannot be great.

Whistling Hawk.

5. *Haliastur sphenurus.*

It is stated by Gould, who is confirmed by Dr. Ramsay, that this bird preys upon carrion, small and feeble quadrupeds, birds, lizards, fish, and the larvæ of insects; and that while on the one hand it is the pest of the poultry-yard, on the other, no species of the *falconidæ* effects more good during the fearful visitations of the caterpillar, and that, so partial is the bird to this kind of food, the appearance of the one is the certain prelude to the appearance of the other.

Brown Hawk.

11. *Hieracidea orientalis.*

Feeds on carrion, reptiles, and insects, and pilfers newly-hatched chickens from fowl-yards, but compensates for this mischief by the havoc it commits among the countless myriads of the destructive caterpillars.

Goshawk.

17. *Astur approximans.*

A bold, powerful, and most sanguinary species, feeding on birds, reptiles, and small quadrupeds, and often seen lurking about the poultry yard, dealing destruction among the young stock of every kind.

Sparrowhawk.

19. *Accipiter cirrhocephalus.*

A bold and daring bird, and very destructive to poultry and pet birds.

28, &c. Strigidæ (Owls).

These birds are nocturnal, feed principally on rats, mice, and other small quadrupeds, and do no harm to the settler. One of them, called *Ninox boobook*, is the bird commonly known as the cuckoo or more-pork.

40, &c. Night-jars and Goat-suckers.

These birds are mostly nocturnal, and do no mischief beyond the occasional destruction of a mantis, but they make away with numbers of night-flying moths and other insects.

51, &c. Swifts and Swallows.

All most useful birds, preying upon flies, mosquitoes, and other insects of the same character. Two of the swallows, *Hirundo neoxena*, which builds an open cup-shaped nest, and *Lagenoplastes ariel*, with bottle-shaped nest, are very friendly to man, and generally build their mud nests under the eaves of houses, where, if drinking-water is collected from the roof, their droppings are sometimes a troublesome nuisance.

Digitized by Google

Bee-eater.

58. *Merops ornatus.*

A beautiful bird, which burrows out its nest in banks of rivers, &c. It feeds upon insects, and is sometimes very destructive in apiaries, by devouring the bees as they arrive at home laden with honey.

Dollar Bird.

59. *Eurystomus pacificus.*

A handsome bird which is often wantonly shot. It lives principally on *coleoptera* (beetles) and does no mischief whatever.

Laughing Jackass.

60. *Dacelo gigas.*

Should be carefully preserved on account of its comical ways, its extraordinary laugh, and its great usefulness in destroying snakes, reptiles, insects, rats, and mice.

Kingfisher.

63. *Halcyon sanctus.*

A handsome and useful bird which devours mantis, grasshoppers, caterpillars, lizards, and very small snakes, which it kills by beating their heads against a stone.

Wood Swallow.

73. *Artamus sordidus.*

A pretty bird of migratory habits, which arrives in great numbers in early summer, and, by its quiet grey plumage tipped with white, and its graceful movements, forms quite a feature in the landscape. It feeds entirely on insects, and may be reckoned among the good friends of the cultivator, to whom it does no manner of harm, but from its curious habit of sometimes clinging together like a swarm of bees, it runs the risk of being destroyed in great numbers by Cockney sportsmen.

Diamond Bird.

81. *Pardalotus punctatus.*

There are several other species besides that named, which is a prettily spotted chubby little fellow frequenting gardens as well as the bush, and tunnelling its nest in banks. It is entirely insectivorous and innocuous.

Black Magpie.

88. *Strepera graculina.*

The food of this bird consists naturally of berries and fruits. It makes its appearance in summer, often in great flocks, and deals destruction to every kind of cultivated fruit, except the orange tribe and passion-fruit. Apples, pears, peaches, and quinces are easily chopped to pieces by its powerful bill. The softer fruits, such as figs, are devoured in a few bites and grapes are swallowed wholesale. Before the maize grains begin to harden, this incorrigible thief, with its strong claws and powerful mandibles, strips back the tough sheathing of the cob, and often leaves not one solitary grain. If driven off it soon sneaks quietly back in the most impudent manner, though, after a little shooting, it becomes so wary that it is difficult to get a shot. It would be a good thing if this pest could be eradicated, and, although its habitat extends, to my knowledge, at least from Melbourne to Brisbane, and its congeners exist in South Australia, Western Australia, Tasmania,

Digitized by Google

and Norfolk Island, it would be possible to keep it down in any particular district if the gardeners therein would cordially combine for the purpose. I have been told that this bird will eat flesh, and that numbers are sometimes destroyed by poisoning a bullock's head and placing it in a tree out of the reach of dogs. It strikes me that it might easily be taken in a wire fish-trap baited with fruit, for if trees are netted and a small opening accidentally left it will force itself through the opening, which it is unable to find quickly when disturbed, and by this means I had the satisfaction during the last fruit season of beating several of the marauders to death. Twine nets, unless too heavy for convenient use, are not a sufficient protection, for on several occasions the birds have torn their way through them in order to get at the protected fruit.

Gray Magpie.

91. *Strepera cuneicaudata.*

Gould states that the food of this bird consists of coleoptera and larvæ of insects, and so it no doubt does to some extent; but I have found it quite as destructive to maize and fruits as its black brother, with which it very freely associates, though it is fortunately not so numerous.

Magpie.

92. *Gymnorhina tibicen.*

A charming, comical fellow, with most melodious notes and amusing habits. Gould states that it lives almost entirely on insects, and that the numbers of locusts and grasshoppers which it devours is immense. In domesticity it becomes very impudent, and lives principally on animal food, so that I can well believe, as I have been told, that in some parts of the country it is rather destructive to young chickens.

Butcher Bird.

99. *Cracticus torquatus.*

Feeds on mice, reptiles, and small birds, not stopping to consider whether they are beneficial or injurious to man, and does not object to insects, but must be considered a useful bird.

Magpie Lark or Peewit.

102. *Grillina picata.*

Feeds entirely on worms and insects and their larvæ, particularly grasshoppers and coleoptera. Being a rather conspicuous and not very timid bird, it unfortunately very often falls an easy victim to the Cockney sportsman.

Blue Jay.

103. *Grauculus melanops.*

Gould states that the food of this bird consists of insects and their larvæ and berries, but the former appear to be preferred, all kinds being acceptable from the useful mantis to others of a minute size; but my garden has often suffered from the depredations of these birds, which, however, seldom appear in sufficient numbers to do any considerable amount of harm.

Thrush.

123. *Collyriocincla harmonica.*

This bird, of beautiful name and musical voice, feeds entirely on insects of various kinds, caterpillars, and their larvæ, and should be carefully protected.

Digitized by Google

Water Wagtail.

139. *Sauloprocta motacilloides.*

A very familiar bird, which frequently perches on the backs of domestic animals in search of insects, which are its sole food.

Razor Grinder.

141. *Seisura inquieta.*

A bird very like the preceding in appearance and habits, but, unlike its fellow, it builds its nest away from water.

Jacky Winter.

149. *Micræca fascinans.*

A most familiar little fellow, which follows the husbandman or gardener whenever land is being turned up, and pounces on all grubs, worms, &c., which are unearthed. If the gardener should leave his spade for a minute, standing in the ground, the bird will almost immediately perch upon it in order to get a good bird's-eye view of the scene of operations.

Robin Red-breast.

165. *Petræca Leggii.*

A beautiful bird, with habits very similar to those of the English robin, and visiting the lower lands only in winter, when it lives entirely on insects, though its English analogue is said to frequent houses for the sake of the bread crumbs often thrown to it. There is also a pied robin (*Melanodryas bicolor*), but it is much rarer than the other.

Yellow Robin.

175. *Eopsaltria Australis.*

Feeds entirely on insects, and has no bad qualities.

Lyre Bird.

179. *Menura superba.*

A shy, retiring, and most interesting bird, which never approaches the haunts of man or cultivated land, but retires to deep gullies where it feeds on centipedes, *coleoptera*, shelled snails, &c., in quest of which it turns over, by means of its strong claws, assisted by powerful muscular thighs, a vast amount of decaying leaves and rubbish. It is quite worthless for culinary purposes, but, notwithstanding the difficulty of approaching it, it is being so ruthlessly stalked for the sake of its wondrous tail that in many places it has been entirely eradicated.

Blue Wren.

185. *Malurus cyaneus.*

A charming little bird which frequents gardens, and is entirely insectivorous and useful.

Dickies.

220, &c. *Acanthiza.*

Several species of birds are comprehended under this head. They are small and insignificant looking, frequent gardens, and pass most of their time in prying about among leaves and flowers in search of their insect prey, and are undoubtedly useful.

Digitized by Google

Double Dick.

229. *Geobasileus chrysorrhœa.*

This tiny bird, with such a pretentious name, is constantly found in gardens in small flocks, which destroy vast numbers of small insects. The trivial name originates from the curious fact that in building its nest the bird makes another small cup-shaped nest on the top or side of the first, for the accommodation of the male, which sits there during incubation by way of companionship with his mate.

Tom Tit.

230. *Geobasileus reguloides.*

A bird very similar to the preceding in its food and habits, except that it does not build the double nest.

Lark.

240. *Anthus Australis.*

Feeds on insects and small seeds, doing no harm to the settler. Neither it nor its almost indistinguishable congener from New Zealand, has the ascending flight, or the charming song of their English analogue, which they much resemble in appearance; but the native New Zealand bird is said to cross freely with the imported English bird, much to the detriment of the singing qualities of the progeny. This however requires confirmation.

Skylark.

241. *Cinchloramphus cruralis.* 242. *C. rufescens.*

Two of the few song birds of Australia with habits of flight and song, much like those of the English skylark, but they are larger birds, and their song is much more powerful and melodious, though perhaps not quite so varied. They are also ventriloquists. They feed exclusively on insects, and ought to be rigidly protected.

Red-head.

253. *Estrilda temporalis.*

A thoroughly conscientious little bird, which has been carefully educated in the knowledge of the difference between "meum" and "tuum," for it carefully refrains from seeds sown by man, and confines itself almost exclusively to the seeds of small weeds, often working over the ground in large flocks, and flying up to the neighbouring trees with a tremendous flutter when disturbed.

Diamond Sparrow.

257. *Estrilda guttata.*

A very beautiful little finch, of the same habits as the red-head, but that it is never seen in large flocks. It has the curious habit of often building its nest among the sticks forming the nest of an eagle.

Satin Bird.

276. *Ptilonorynchus violaceus.*

This extraordinarily interesting and beautiful bird feeds naturally on wild fruits and berries, and it is therefore not surprising that, in places convenient to its haunts, it despoils gardens to an enormous extent.

Digitized by Google

Fruit Thrush.

283. *Mimeta viridis.*

Another beautiful bird of the same habits with respect to food as the satin bird. I have seen the mimeta in flocks marauding in company with the black magpie, as mentioned by Gould, and imitating the notes, not of the black but of the gray magpie.

Crow.

Corvus coronoides. 290. *Corone australis.*

These two birds are much alike in appearance, and associate freely together, but it is singular that that acute observer Gould did not notice the difference. They feed on carrion, insects, berries, seed, grain, and other vegetable substances; often steal the eggs and young of domestic poultry; and in the early winter months assemble in flocks, and are very destructive in newly sown grain fields.

Summer Bird.

306. *Ptilotis Lewini.*

Feeds, according to Gould, on insects, pollen, and occasionally fruit and berries. I have found it exceedingly destructive to most fruits and exceedingly difficult to shoot.

Chiccup.

320. *Ptilotis chrysops.*

An incorrigible fruit eater, smaller than the last but not less mischievous.

Mock Regent Bird.

324. *Meliphaga phrygia.*

A very handsome honey-eater which would be troublesome in orchards if it were numerous.

Gill Bird.

331. *Anthochœra carunculata.*

Another honey-eater which, unlike its fellows, rarely or never attacks fruit. It appears in winter, and is a very good bird for the table.

Leather-head, or Bald-pated Friar.

334. *Philemon corniculatus.*

This bird, whose food usually consist of honey, pollen, wild figs, and berries, is often very troublesome in fruit gardens.

Cobbler's Awl.

339. *Acanthorynchus tenuirostris.*

This honey-eater, with its very descriptive name, frequents gardens, but is not so numerous as to do much mischief, though he does his best, piercing grapes and other fruit with his slender bill, and thereby effectually destroying them.

Old Soldier.

353. *Myzantha garrula.*

A terrible pest in gardens, which in some districts it frequents in great numbers, destroying an immense amount of fruit.

Digitized by Google

Silver Eye.

360. *Zosterops cærulescens.*

The greatest pest which gardeners in this Colony have to contend with. Gould mentions insects only as its food, and it is credited with destroying aphides and American blight, but any good which it may thus do is entirely overbalanced by its persistent attacks on almost all garden fruits. Grapes and figs can hardly be grown without netting or bagging, and other kinds suffer immensely too. If the bird would finish one fruit before commencing on another he might be forgiven on account of his good qualities; but he seems to take a mischievous delight in sampling every fruit without regard to his own wants, and thus it often happens that every berry of a bunch of grapes is ruined, and every fruit, on a loquat, apricot, or other tree, is so grievously maltreated that it quickly becomes worthless, especially if rain should afterwards fall.

Woodpecker.

366. *Climacteris scandens.*

This tree-creeper is constantly seen ascending the trunks of trees in search of its insect prey, and should certainly not be destroyed as it does no kind of mischief.

Grasshopper Hawk.

378. *Cuculus pallidus.*

The food of this bird, and of all cuckoos, consists entirely of insects, and notwithstanding their decidedly immoral habits every one of the tribe should be protected.

White Cockatoo.

391. *Cacatua galerita.*

Feeds on seeds, grain, small tuberous and bulbous roots, &c., and commits the greatest devastation upon fields of newly sown grain and ripening maize, so that farmers wage incessant war on it.

Black Cockatoo.

397. *Calyptorynchus Banksii.* 401. *C. Funereus.*

These well known birds have never been known to interfere with the operations of man, but they are often wantonly shot for the sake of the tail feathers, crimson-barred in the former, and yellow in the latter. They frequently appear in small flocks in wet weather, and, with their immensely powerful mandibles, strip off the bark of dead trees in search of grubs and beetles, and they even cut out large grubs from the solid wood.

Lory.

415. *Platycercus Pennantii.*

Rosella.

422. *Platycercus eximius.*

Both these beautiful birds occasionally attack fruit and young maize. I have known the latter to amuse itself by nipping off the young shoots of the arbor vitæ, which is apparently done either for the sake of the taste of the resinous juice, or for mere mischief, as they leave the ground strewed with the pieces bitten off.

Digitized by Google

425, *&c. Grass Parrakeets.*

These birds, comprised in several genera, feed on the ground, generally in flocks, and devour the seed of various native grasses and other small plants, and are not at all mischievous.

Blue Mountain Parrot.

448. *Trichoglossus Novæ Hollandiæ.*

This bird is a true honey-eater, with brush-shaped tongue, and, like other honey-eating birds, sometimes enters gardens and preys upon the fruit it finds there, and its smaller relations are often exceedingly mischievous.

451. *Fruit Pigeons.*

It is singular that most fruit-eating pigeons, as well as honey-eating birds, have brilliant and beautiful plumage. In this way the former may generally be known. They never enter the garden, and they do neither good nor harm to man.

Top-knot Pigeon.

458. *Lopholaimus antarcticus.*

Is really a fruit-eating pigeon, without the usual brilliant colours. It travels in large flocks in search of figs, palm-berries, &c., but does not interfere with cultivated fruits. A flock once entered my garden at Double Bay, but confined its attentions entirely to a Moreton Bay fig-tree growing there, and disappeared within two or three days.

Wonga Wonga.

461. *Leucosarcia picata.*

This bird is industriously sought for as a table delicacy. It feeds on seeds and wild fruit stones, but never interferes with the work of the settler.

Bronzewing.

462. *Phaps chalcoptera.*

Feeds on small berries and wild seeds, and often enters wheat-fields after reaping in search of fallen grain, but is never mischievous.

471, *&c. Doves of various kinds.*

These birds, too, are perfectly harmless.

Brush Quail.

480. *Turnix varius.*

Feeds among scrub, and does no harm whatever.

Stubble Quail.

486. *Coturnix pectoralis.*

This bird often appears in great numbers about the time of the wheat harvest, but does no harm, as it only picks up the grain which would otherwise be lost.

Curlew.

496. *Œdicnemus grallarius.*

Is a stone plover and a night bird, which feeds principally, if not wholly, on worms and insects, and must be considered a useful bird. It is often domesticated and placed in gardens, where it is an interesting object, and employs itself usefully in destroying noxious things.

Digitized by Google

Spur-wing Plover.

500. *Lobivanellus lobatus.*

An elegant bird, which frequents swampy places and feeds on insects and worms.

Golden Plover.

504. *Charadrius fulvus.*

This bird and the other plovers, and plover-like birds, feed in the same way as the spur-wing, and do no manner of harm.

505, *&c. Dotterels and Sandpipers.*

These, and other birds of the same character which frequent sea-beaches and feed on insects, crustaceans, and shellfish, do no harm of any kind.

Snipe.

533. *Gallinago australis.*

Lives and feeds much in the same way as the spur-wing plover.

535, *&c. Swamp birds.*

The curlews, ibis, spoonbills, cranes, jabirus, herons, and bitterns, and the various species of the rail tribe, which all feed about swamps on crustaceans, worms, insects, frogs, fish, and such like things, are all harmless.

577, *&c. Swans, Geese, and Ducks.*

These birds are quite innocuous, with the exception, perhaps, of the wood duck, *Branta jubata*, which is really a goose. I have known the wood duck to play great havoc with young lucerne crops sown near its haunts.

596, *&c. Gulls, &c.*

These birds, which live on the sea or its shore, are neither beneficial nor injurious to cultivators, with the exception perhaps of *Larus Pacificus* and *L. Novæ Hollandiæ*, which are easily tamed, and, being placed in gardens, are useful in destroying slugs and worms. In New Zealand I have seen the local form of these birds at a considerable distance from the sea, following the plough in great numbers for the sake of the grubs and worms turned up, and I believe that the same thing happens here also.

In Dr. Ramsay's list he enumerates 450 species of birds as indigenous to New South Wales, and of these I have specially referred to sixty-seven. The remaining 383, part of which are referred to only in general terms, may, subject to corrections for errors, be classed as neutral; but this statement must be taken reservedly, for some of the birds are only non-mischievous for want of opportunity, and under certain changed conditions they may become as troublesome as some of the worst.

It will be noticed that in very few instances have I pronounced absolute condemnation, and I have in many cases given both the bad and good qualities of the bird in question, in order that the reader may draw his own conclusions. I have often done this specially, because a bird which is very troublesome in one district may be, from want of numbers or from other causes, almost inoffensive in other. As matters at present stand, the only birds which, if

Digitized by Google

it were possible, I should like to see absolutely exterminated "without benefit of clergy" are the black and gray magpies, the silver-eye, the old soldier, the ptilotis (two species), the white cockatoo, and the crows.

It will hardly be considered out of place here to refer to some of the birds which have been introduced from abroad.

The one which has thriven most extraordinarily and has taken possession of many towns and of large tracts of country, is the common English house sparrow, which is proving itself most mischievous, by filling up the gutters of houses, destroying whole crops of millet and other grain, as well as flower and vegetable seeds and young plants, and often driving away some of our useful Australian birds. The bird intended to be introduced was, no doubt, the useful hedge sparrow, but its impudent larrikin substitute is now here and feels itself thoroughly at home, and is not likely to be got rid of, in spite of the efforts at extermination which have already been commenced in some places.

The English blackbird has also been introduced, but has not thriven much, though in New Zealand it has multiplied largely and has already become a great pest in fruit gardens.

The Mina, from India, which is said to be quite a glutton for caterpillars and other noxious things, has spread a good deal round Rushcutters' Bay, where it takes possession of the roofs of houses, and has begun to play havoc with fruit, having, like certain unfeathered bipeds, been demoralized by the improvement of its environment.

Other birds, such as the English starling, the skylark, the Californian quail, the English pheasant, the guinea fowl, and the peacock, have been turned loose in various parts of the Colony, with very poor success, and perhaps with some of them it is quite as well so.

The practice of indiscriminately introducing birds and animals at the will of any one who is entirely ignorant of their qualities is most reprehensible, and should not be allowed without express permission of some Government authority—say, for instance, the Minister for Mines and Agriculture.

The enormous amount and the deleterious nature of the foreign weeds introduced since the foundation of the Colony ought to satisfy any reasonable person that unrestricted and inconsiderate attempts at acclimatisation, as a general rule, do much more harm than good.

8th September, 1890.

Digitized by Google

Appendix H.

Insecticides.

The following notes by Dr. J. C. Neal, the Entomologist to the State Agricultural College, Florida, U.S.A., will be found of interest:—

Nothing has been done in practical entomology that has shown better results than the use of emulsions containing kerosene or insoluble poison held in suspension, and their application to infected plants in a fine spray by various atomizers and spray pumps. With one of these machines an insecticide can be brought into contact with the insect, and its feeding ground thoroughly impregnated with poison. It is needful that the spray be very fine, and that it be applied with force to reach every infected part, or the hiding-places of insects. For cases like infected buildings, as chicken-houses, that are usually very difficult to keep clear of mites and tick-fleas, the spray of carbolized whitewash, tobacco, kerosene, oil of tansy, &c., is easily applied.

I append a few formulas that have been tried and found to be valuable:—

I. Solutions.

1. Tobacco, 1 lb.; boiling water, 3 gallons; strain when cool. Very effective when used as a spray against flea beetles, lice, aphides (plant lice), and ticks.

2. Quassia chips, 1 lb.; boiling water, 3 gallons. This very bitter solution is good for prevention rather than cure. Apply as a spray to rose bushes and to kill plant lice.

3. Pyrethrum: 1 ounce of the "Buhach" powder added to 2 gallons of cold water for cabbage, beets, tobacco, or any plant used for food, as this is not poisonous.

4. London purple, Paris green; actively poisonous. Use 1 lb. of the poison to 200 gallons water or other solutions. Dissolve a little flour paste in the water to make it sticky. Stir frequently. Applied to trees, it is a sure cure for all insect plagues.

5. Bordeaux mixture: this, while primarily a fungicide, has some good qualities as an insecticide. It is prepared thus: 1 lb. sulphate copper, dissolve in 1 gallon hot water in one vessel; in another, 1 lb. rock lime is slaked in 1½ gallons *cold* water, and, when cool, pour into the copper solution and strain; add 2 gallons water, and it is ready for use. (Cook.)

6. To this, add London purple, 1 lb. to 200 gallons of the Bordeaux mixture. This sprayed over non-bearing grape vines or tomato vines not in bloom, &c., will prevent rot and insect life as well.

7. Soap: 1 lb. resin soap to 1 gallon hot water. This, used as a spray, is often a valuable remedy for the attacks of small and soft insects. In fact it can be used to advantage for soft scales, when they are few. It should be often used to get the best effect.

8. Water in which tar has been placed acquires some value as an insecticide.

II. Emulsions.

(Soap is used as the basis of most of these.)

1. Stronger emulsion of kerosene: 4 lb. soap, dissolve in 1 gallon hot (boiling) water; remove from the fire and add 2 gallons kerosene while hot. Churn with a spray pump violently till the oil is emulsified; add 27 gallons cold water for use.

Digitized by Google

2. Weaker emulsion (Cook): 1 lb. soap, dissolve in 2 gallons hot water as before, but add only ½ gallon kerosene and dilute till 8 gallons solution are made. Adding ½ pint spirits turpentine to No. 1 increased its stability (Tracy). Allowing even 40 gallons of water to be added to 1 gallon of the emulsion and sprayed on tomato worms, it was very effective, and did not injure the plant in the least.

3. Emulsion 1: Adding 2 oz. of balsam of fir with the kerosene makes an emulsion that adheres better to the surface of leaves, and is slightly superior to No. 1 for the armoured scales.

4. Using emulsion 2, only substituting the same quantity crude carbolic acid for kerosene, is especially valuable for oak and pear insects.

5. The same formula, using oil of tansy or sassafras 1 oz. in place of the ½ gallon kerosene, is efficacious for roaches, mites, ticks, bed-bugs, and pests.

III. Arsenical, Resinous, and other Compounds for Spraying.

1. To kerosene emulsion No. 1 add 1 oz. London purple, and mix well. Highly recommended.

2. Resin compound: Caustic soda, 1 lb.; resin, 8 lb.; to make 32 gallons compound. Dissolve the soda in 1 gallon boiling water; take out half; add the resin slowly to the remainder and boil, stirring rapidly; when dissolved, add slowly the part taken out. Dilute till it will pass readily through a thin cloth, which should be always done. Dilute before using to 32 gallons. This alone is very valuable against most scales, but the addition of 2 oz. London purple makes assurance doubly sure against even the dreaded *Icerya*.

3. White arsenic, ½ lb.; sal soda, ½ lb.; water, ½ gallon; boil till a solution is made, then dilute to a gallon. 1 quart of this to 50 gallons resin compound—use on peach, pear, and plum, either after fruit is gathered or just as bloom has fallen.

IV. Powders.

1. While slaking 1 peck fresh lime, add 1 quart kerosene, sift out lumps; apply lightly to cucumbers, melons, and tomatos, for beetles and squash-bugs.

2. 50 lb. land plaster, mix 1 pint crude carbolic acid; sprinkle over leaves and vines for aphides and beetles.

3. Pyrethrum: This, the powdered flowers of the pyrethrum, when fresh, is especially valuable if sprinkled on infected leaves, or in boxes, drawers, &c. House flies and mosquitos are easily subdued by closing up the room tightly and slowly burning in it a spoonful of the powder. It is slightly narcotic, but not at all dangerous to human life. For infected cabbage, lettuce, celery and the like, or tobacco, it is the best insecticide we have, involving no danger if eaten.

4. Tobacco: This insidious narcotic is valuable in the destruction of plant-lice, mites, &c. Applied as a powder or by its fumes it often is quite beneficial.

Bisulphide of carbon, like chloroform, is highly volatile, but its vapour, unlike that of chloroform, is very explosive. Bins and corn cribs can be easily rid of ants, weevil, rats, mice, beetles, &c., if the room be made air-tight, and occasionally filled from the top with the vapour of bisulphide of carbon. This is the only way in which our farmers ever will keep corn, peas, &c., from insect attacks.

Sydney: Charles Potter, Government Printer.—1890.

Digitized by Google

Digitized by Google

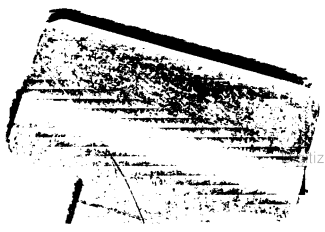
Digitized by Google

Digitized by Google

YC 62028

485034
SB354
C5

UNIVERSITY OF CALIFORNIA LIBRARY



Digitized by Google

Digitized by Google